the OIL AND GAS JOURNAL
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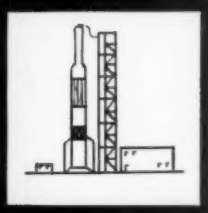

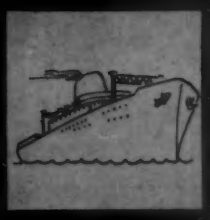
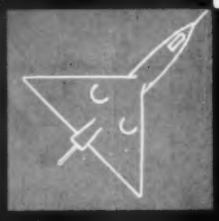

Journal's annual forecast of **MILITARY DEMAND**
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Libyan oil pushes into world markets ▸ 120

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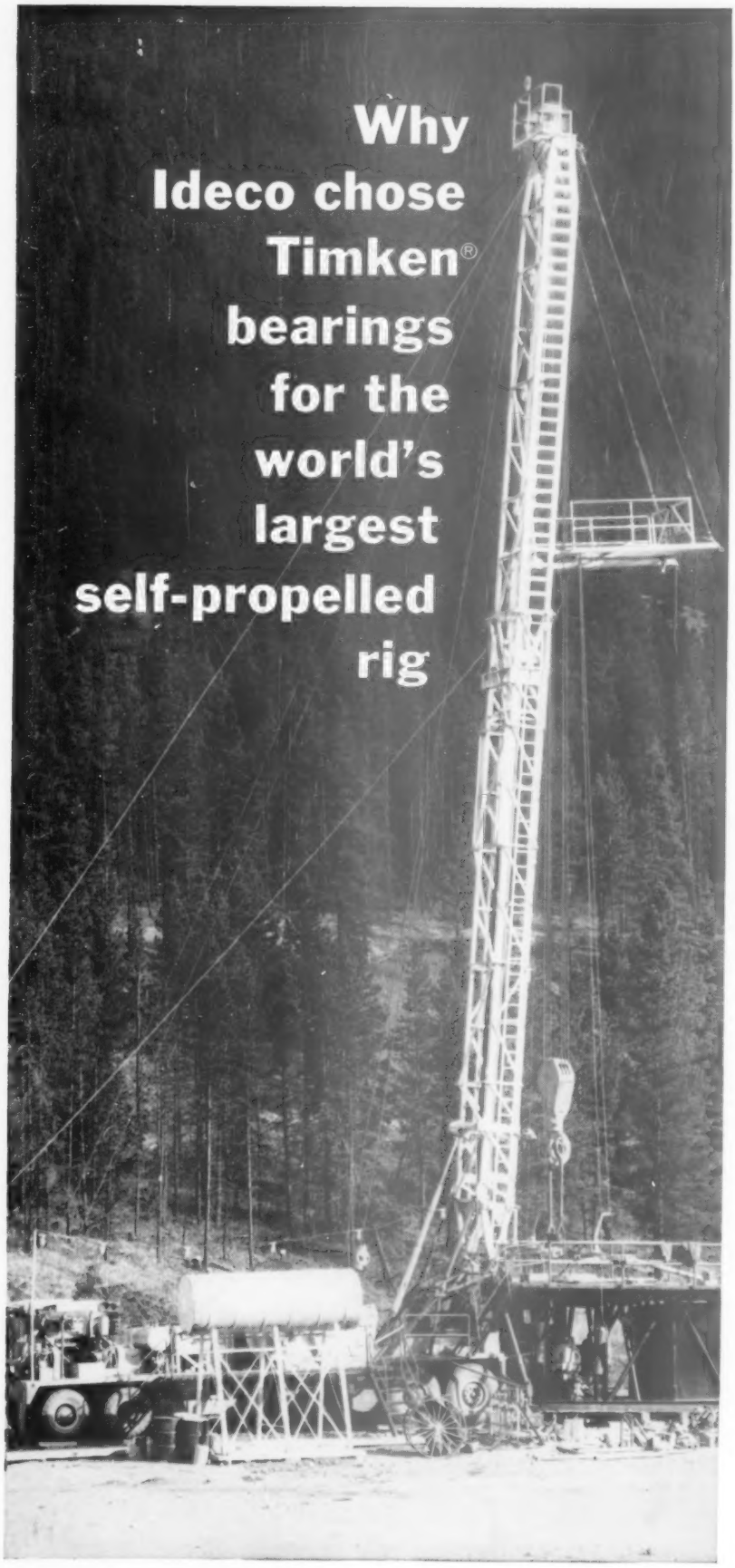

THIS Ideco DIR-600 Drive-In Rambler Rig is designed to be faster on the job and between jobs, operate economically too. To be sure, Ideco engineers specified Timken® tapered roller bearings for the crown and traveling blocks, rotary, swivel, right angle gear box, draw works and wheels.

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OIL AND GAS JOURNAL
Vol. 59, No. 44

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Technology

Production

Completing Ellenburger wells for maximum production and life **128**
By Steven Gerolde and H. B. Wofford

Statistical study of completion methods in 481 wells in 16 fields producing from the Ellenburger formation in West Texas and New Mexico yielded results that may help make your next well to be a better one.

Refining-Processing

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Holding ponds are effective in waste-water treatment **161**
By Troy C. Dorris, B. J. Copeland, and Donald Patterson

About 40 days' holding time will reduce nearly all components to minimum values. Peak reduction in pH and alkalinity takes about 25 days. BOD and COD are reduced 80% in 25 days and 50% in 5 weeks, respectively. Ammonia nitrogen, phenol, and sulfides are reduced about 90% by the end of 5 weeks.

Reviews of new processing books **166**

New specifications for cooling-tower lumber **167**
By W. T. Henry

Maintenance costs of cooling towers have risen considerably because of damaging wood decay. Replacement costs often run as high as 20% of the original tower cost for every 6 years of operation. It pays in the long run to adequately treat the wood.

Parallel plates improve oil separation **173**
By J. Cornelissen

New interceptor unit offers advantages at lower investment. Performance of existing units can be improved by installing inclined parallel plates.

Pipelining

Calibrated meter prover is accurate, fast **137**
By R. H. Pfrehm

This adaptable unit, utilizing calibrated pipe, has these features: (1) accuracy greater than 0.02%; (2) run time under 1 minute; (3) remote, automatic control possible; and (4) meter complete in itself.

Pipeline construction report **176**

Drilling

Performance of mud additives in deep wells **145**
By John Kelly, Jr., and Daniel E. Hawk

A new circulating unit has been constructed at Socony Mobil Oil Co. so that drilling-mud performances can be studied at high temperatures. The unit simulates the heating, cooling, and aeration cycles actually encountered in the field mud. Effects of each additive can be pinned down.

THE OIL AND GAS JOURNAL **Newsletter**

October 30, 1961

Significant this week

Military-fuel-demand forecast has been revised upward.

Change isn't breathtaking, but it adds up to a hefty increase.

New forecast says military requirements through 1965 will range from 6 to 12% above estimates made last year. Latter covered period through 1964.

Quickened tempo of national defense program caused upsurge in estimated needs of the military establishment, which ranks as oil's single biggest customer.

Annual forecast of military fuel demand—a Journal exclusive—begins on p. 99.

Sidelight on military demand: Army's pushing ahead in its search for practical multifuel engine.

For example, it's testing new four-cylinder, compression-ignition engine developed by Avco Corp. under military order. Engine runs on low-grade gasoline, diesel fuel, or JP-4, and uses only 60% as much fuel as conventional type (p. 113).

If FPC goes along with producers' Permian-basin testimony on how gas pricing should be handled, regulatory mess might be cleared up quickly.

That's the takeoff point in a new series of articles on gas pricing by the Journal's chief editorial writer, Henry D. Ralph.

His first article interprets the case which industry presented at recent Washington hearing (p. 109).

New look in gas hunting: Some companies budget directly for gas exploration nowadays.

Phillips geologist C. M. Allen, reporting on trend, says gas can no longer be treated as mere by-product in search for oil.

Allen also says division of exploration money to allow a company to concentrate on either oil or gas search provides management with a valuable new tool (p. 102).

Industry pessimists note: Atlantic Refining's Henderson Supplee, Jr., says his company looks for speedup in its profit growth during next 5 years.

He backs up this optimism by pointing out how Atlantic has pulled out of doldrums that beset it not long ago (p. 118).

Maximum protection for geological records is offered by new Houston firm (p. 114).

Two more centers are being set up to provide drill-stem-test data to cooperating producers (p. 114).

Matching similar move in U. S., some Canadian drilling contractors are boosting rig-crew wages (p. 117).

In oil news from abroad:

Valve-turning ceremony at Marsa el Brega has officially made Libya an oil-exporting nation, and crude is flowing at rate of 60,000 bbl. daily into export markets (p. 120).

Peacefulness was hallmark of third Arab Oil Congress, but basic rifts between producer nations and western oil companies haven't been narrowed by the placid performance (p. 122).

News in the making

Oil-company earnings for first 9 months look pretty good despite poor third-quarter showing.

Early reports: Socony Mobil, $161.6 million through September, up 19% over first 9 months of 1960; Creole, $181.9 million, up 15.6%; Sun, $38.2 million, up 9.7%; Gulf, $248.9 million, up 4.6%; Atlantic Refining, $31.6 million, up 16%; Continental, $42.7 million, off 7.8%; Shell $103 million, down 0.96%.

Most executives expect profits for full year to trail 1960 unless products prices firm up in fourth quarter.

Look for FPC to make important policy statement on area-gas pricing in next few weeks.

Informed sources say agency probably will set firm prices for South Louisiana. And it is expected to clarify policy on such controversial questions as dual prices for old and new gas.

Meanwhile, FPC obviously is tickled pink over amount of cooperation shown by Permian basin producers at this month's Washington hearing.

(For rundown on how FPC's new chairman, Joseph C. Swidler, regards some thorny industry matters, see p. 104.)

Gas turbine for shaft power will be incorporated in Helmerich & Payne drilling rig soon.

General Electric developed turbine, known as Model 901 Turboshaft engine. It's in 500-hp. class.

In Kingfisher County, Oklahoma, nation probably has its biggest oil field in 13 years.

One estimate: Hennessy field area can be classed as 500-

million-bbl. primary reserve. Field is far from defined, and area will take on ever-greater significance as pools continue to merge.

If 500-million-bbl. figure holds, Hennessy will be first U. S. find of this size since West Texas' Kelly-Snyder, and biggest in Oklahoma since Oklahoma City field.

Hydrocracking capital costs could tumble if existing cat reformers can be economically adapted to this operation.

Most interested in the possibility: Refiners with excess reforming capacity and a plentiful supply of distillates.

Cat reformers--equipped with hydrogen compressors, high-pressure reactors, and adequate heat-exchange capacity--may lend themselves to at least some hydrocracking reaction conditions.

More benzene and naphthalene plants are in the works.

Gulf Research & Development, which has come up with thermal hydrodealkylation process (THD method) for converting refinery fractions to benzene and naphthalene, reports it is planning three commercial plants for unnamed companies.

Use of hydrocracking for maximizing yields of middle distillates at expense of gasoline output is planned for two foreign refineries.

Mitsubishi Oil will include 9,500-bbl. Lomax unit in the second-stage construction of 40,000-bbl. refinery completed last May at Mizushima Okayama, Japan. And Caltex will include 6,500-bbl. isocracker in the 40,000-bbl. plant it is to build at Frankfurt, Germany.

Canadian exports to U. S. in January are expected to average about 215,000 bbl. daily.

That means exports will be down slightly from December's forecast, and 15,000 bbl. daily above the average for last half of 1961.

Construction of Interprovincial's proposed 12-in. line from Hamilton, Ont., to Buffalo this winter hinges on Canada's continued exemption from imports controls in regulations to be announced in mid-November.

Interprovincial could go ahead with project next month if National Energy Board approved, delivering crude first to Ashland and later to Mobil's refinery.

New returns from Pennsylvania continue to reflect slump in gasoline sales following additional 2-cent state tax.

Boost took effect last spring, kicking total state-federal levy to 11 cents. Eight-month figures just released are 40.4 million gallons short of last year's figures for same period.

In the 10 years prior to 1960, Pennsylvania had average sales gains of 116.5 million gallons a year.

Market memo

Oct. 30, 1961

Prices may soon head upward in the Mid-Continent.

Gasoline prices have become so low refiners can buy material on the spot market cheaper than they can make it. The Group 3 market for gasoline is pegged at 9.5 cents per gallon for unbranded regular. Enough is going at 9.25 cents in the northern section to make this price shaky, and refiners can buy on inter-refinery deals at about 9 cents.

Several refiners are buying at that price. A few inter-refinery deals were completed last week. More are in the wind.

A likely result: The glut of gasoline on the market should start evaporating soon—**IF** refiners also hold back on their runs. This will mean firming product prices. They will restore confidence also in crude prices which still are under pressure in the region.

Other markets: The Gulf Coast and Mississippi River markets report little activity with gasoline considered in fair shape for the season and distillates firm. The East is still waiting for cold weather to spur heating-oil activity while gasoline continues to gyrate. Strength is felt at Norfolk, Indianapolis, and in New England while new weakness is showing at Chicago, Buffalo, and in Pennsylvania.

Crude prices remain unchanged, and there's no present inclination among buyers to cut. They apparently are waiting to see what comes from current efforts to improve product prices.

Close examination of new Pure postings reveals two unnoticed changes. Price of Oklahoma sweet of 30°-gravity and below was increased and Kansas crude of 35°-gravity and below was cut due to changes in the differentials. The $3.05 top was unchanged.

Advertising report: Shell is highly pleased with results of its unique all-newspaper advertising campaign of 41 different ads in 1,200 newspapers. Gasoline sales in first half were up 4% against only 0.6% gain for industry as whole . . . But here's a shocker—the public basically does not believe oil-industry advertising. It knows something about oil but wants to know more, a limited survey by public relations firm for the oil drain promotion program of API revealed.

For management: Skelly will move all its marketing accounting from Kansas City into Tulsa by June 1962. Move of marketing headquarters will follow in 1963 . . . **Apco Oil Corp.**, the Oklahoma refiner and marketer, has split its common two-and-one-half-for-one and made application for listing on the New York Stock Exchange . . . **Arkansas Louisiana Gas** plans a big service-station building program in Arkansas, Louisiana, Texas, Oklahoma, and Kansas to provide a market for 200,000 gal. of gasoline daily now being produced at its gas-liquids extraction plants.

New deals: Second major distributor in New England to sign with Cities Service this month is Pacific Oil Co., Fall River, Mass., which operates in southeastern Massachusetts and Rhode Island. It has 52 outlets distributing 13 million gallons of gasoline annually. Earlier, Cities Service signed three distributorships owned by Warren Equities with 165 service stations and a volume of 40 million gallons.

Good Wells Make Good News

A Report on Some Recent Interesting Acidizing Treatments

October 30, 1961

Dowell engineers have available the most complete line of acidizing materials in the industry. Here are four recent examples of how some of these materials were used to help operators improve their wells:

- **Lafourche Parish, South Louisiana** (Old Oil Well) Production had declined to 12 bopd on gas lift. Pay was the Miocene. Perforations were from 11,715 to 11,734 feet. Dowell acidized using Mud Acid emulsified with oil to retard acid reaction and to avoid contaminating formation with water. 4000 gallons of fluid was injected in eight stages of 500 gallons each. A two-barrel slug of gelled water diverting agent preceded each stage. *After treatment, well produced 187 bopd on gas lift.*

- **Madison County, Southeast Texas** (New Gas Well) Although drill stem test was negative, operator decided to run casing and perforate because cores looked good. Pay was the lower Glenrose lime at about 10,000 feet. Dowell injected 1000 gallons Super Mud Acid to clean up the immediate well bore area, then acidized the formation with 2000 gallons acid-oil-emulsion type Retarded Acid. 10,695 cubic feet of nitrogen was used to displace the acid. Then, 50 barrels of flush water were injected with 15,000 cubic feet of nitrogen. One hour after treatment, *well tested 1000 mcfd and 50 barrels distillate per day. Operator is pleased with results.*

- **Zavala County, South Texas** (Old Oil Well) Scale had choked production down to 1½ bopd pumping. Well produces from San Miguel sand through 2-inch tubing perforated from 4402 to 4412 with 8 shots per foot. Dowell used 1000 gallons regular acid with demulsifier to wash perforations. Acid was injected through a straddle packer lowered one foot at a time to assure opening of all perforations. After washing and soaking, packer was again lowered at one-foot intervals while acid was reverse circulated. Well was then shut in overnight. *Two weeks after treatment, well was pumping 23 bopd.*

- **British Columbia, Canada** (Old Gas Well) This well had been producing from the Nikanassin sand through two sets of perforations between 3757 and 3808. Production had declined from 4000 mcfd to 1800 mcfd. Dowell used Abrasijet® to cut circular notches in casing at 3761 and 3799 feet. Then, three barrels of Mud Acid were washed over notches at rate of one barrel every 10 minutes. An additional nine barrels of Mud Acid were squeezed into formation at 3 bpm. Pressure broke from 2350 to 1000 psi during squeeze. *After treatment, well tested 18,000 mcfd open flow—4½ times the original test when the well was new.*

Dowell engineers use acid, special materials and creative engineering every day to help operators improve net profits. Discuss your next acidizing job with a Dowell engineer. For service or more information, call Dowell. Dowell services and products are offered in North and South America, Europe, North Africa and Iran. Dowell, Tulsa 14, Oklahoma.

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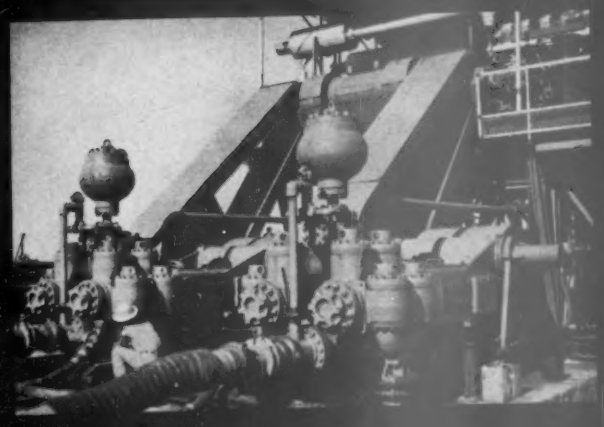

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Expert teamwork goes with J&L drilling equipment. Parts and service are made readily available, and J&L men take an active interest whenever and wherever the rig moves in.

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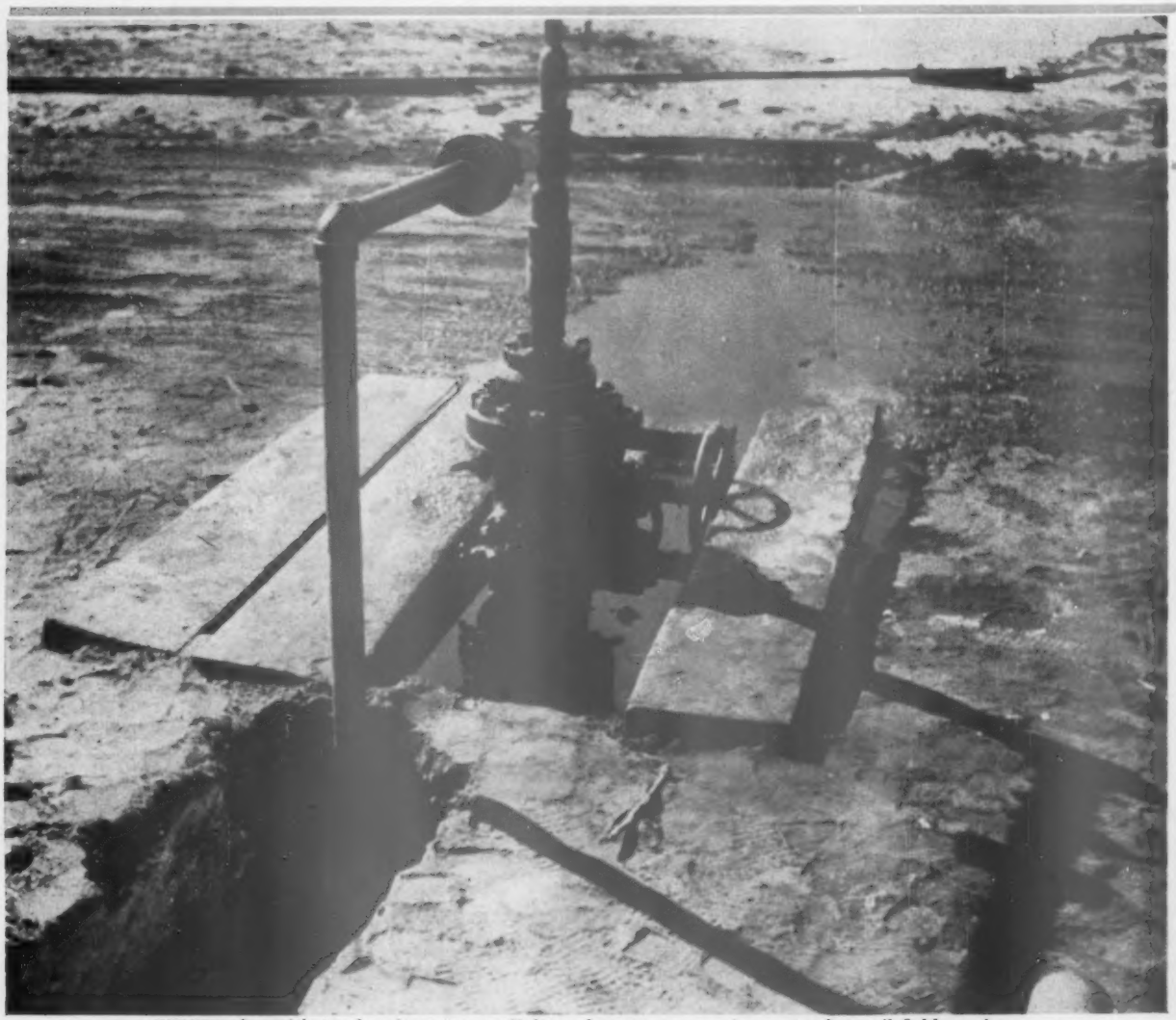

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Next, **DELRIN** pipe saves you money in installation costs. You can lay it on top of the ground, bury it to the depth made by a field plow, or ditch it in, depending upon field conditions. Joints can be made within 25 seconds with no need for precision cutting and threading. Three-men teams can easily average 500-600 feet per minute after ten minutes' practice with the integral heat-joining system. And the line may be immediately pressure tested at 150% of pressure rating upon completion of the last joint.

Finally, **DELRIN** pipe lowers pumping costs because it can handle a greater volume of salt water than other pipes of the same inside diameter. This increased flow is due to the exceptionally low friction loss of **DELRIN**.

Salt-water systems are just one application for versatile **DELRIN** pipe. Here's why it is equally well suited for flow lines, gathering lines, or water-flood lines:

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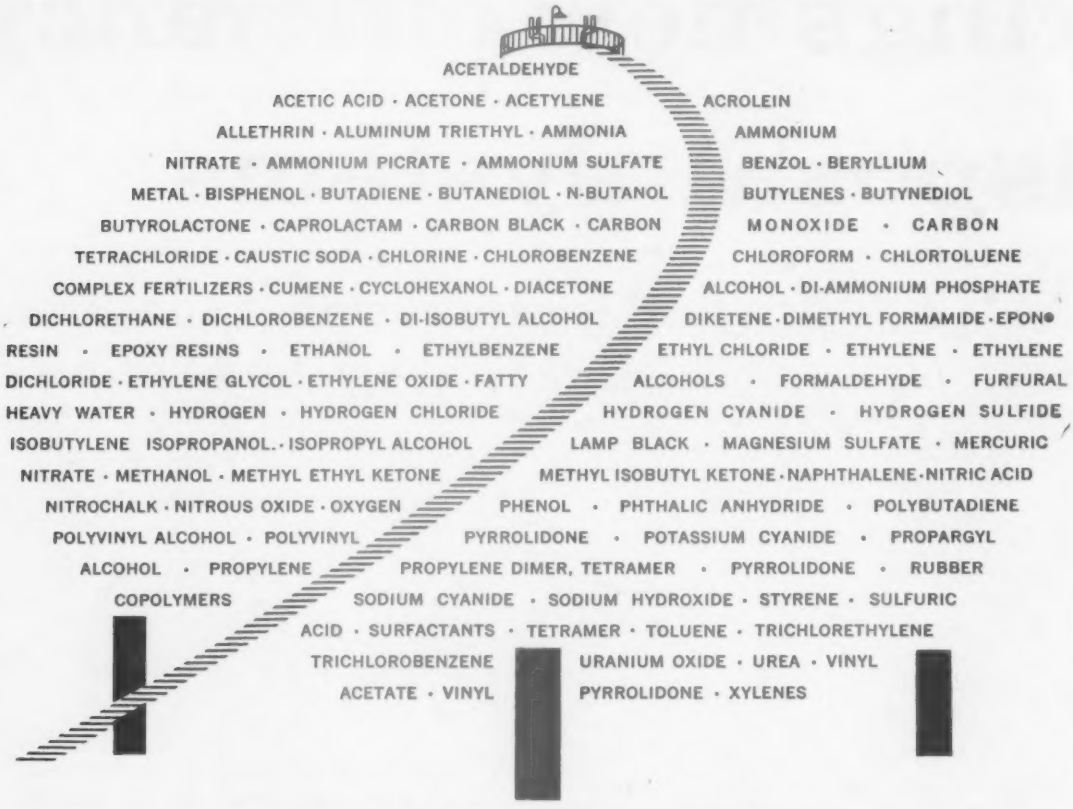

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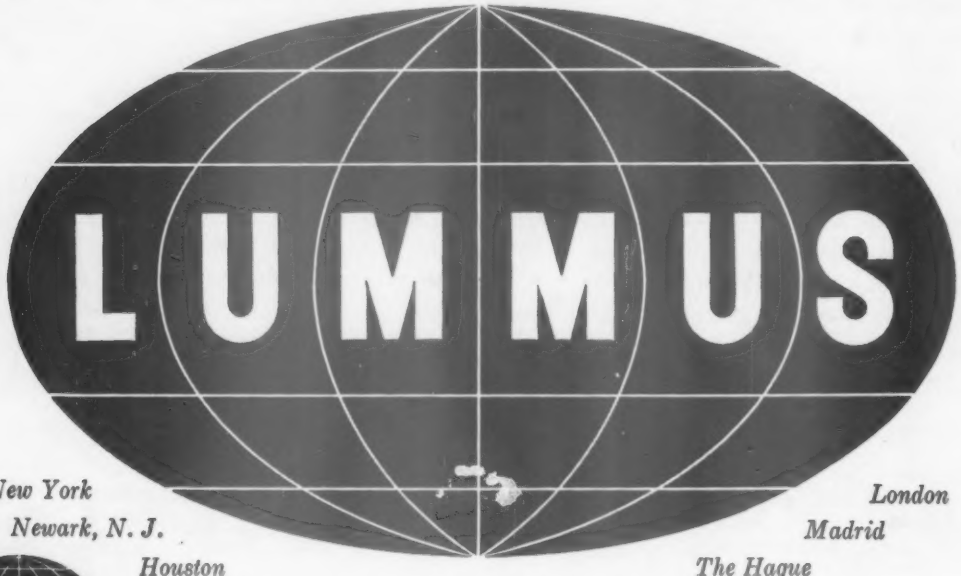

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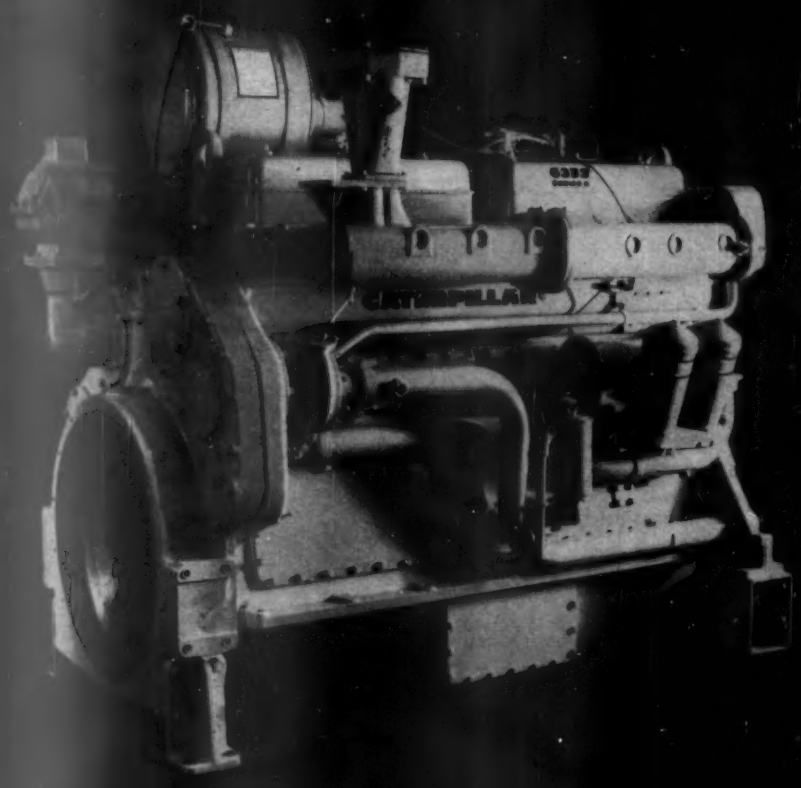

New for the oilfield

Caterpillar introduces its third new natural gas engine in 1961 . . . the G353

This new high-horsepower gas engine has the advantage of: low initial cost, low operating and maintenance costs and long life. It's built on a basic high-strength diesel block using standard diesel parts everywhere possible . . . inexpensive to operate and maintain . . . and with traditional Caterpillar reliability.

The new Cat G353 is available in the following configurations to meet your power needs: Turbocharged and Aftercooled, 10:1 compression ratio, 335 HP continuous . . . naturally aspirated, 10:1 compression ratio, 250 HP continuous . . . and, naturally aspirated, 7:1 compression ratio, 225 HP continuous.

In addition to this power flexibility the new 6-cylinder G353 offers many job-proven Caterpillar features . . . water-cooled manifold, water-cooled oil cooler, dry-type air cleaner and low-tension ignition system. Features such as these mean better engine service and low operating cost.

Cat Natural Gas Engines from 200 to 670 HP (continuous) and Cat Natural Gas Electric Sets from 100 to 450 KW cover a wide range of oilfield power requirements. Mention your requirements to your Caterpillar Dealer and he'll come up with a power plant custom-engineered for you . . . or specify Cat Natural Gas Engines in your next equipment purchase.

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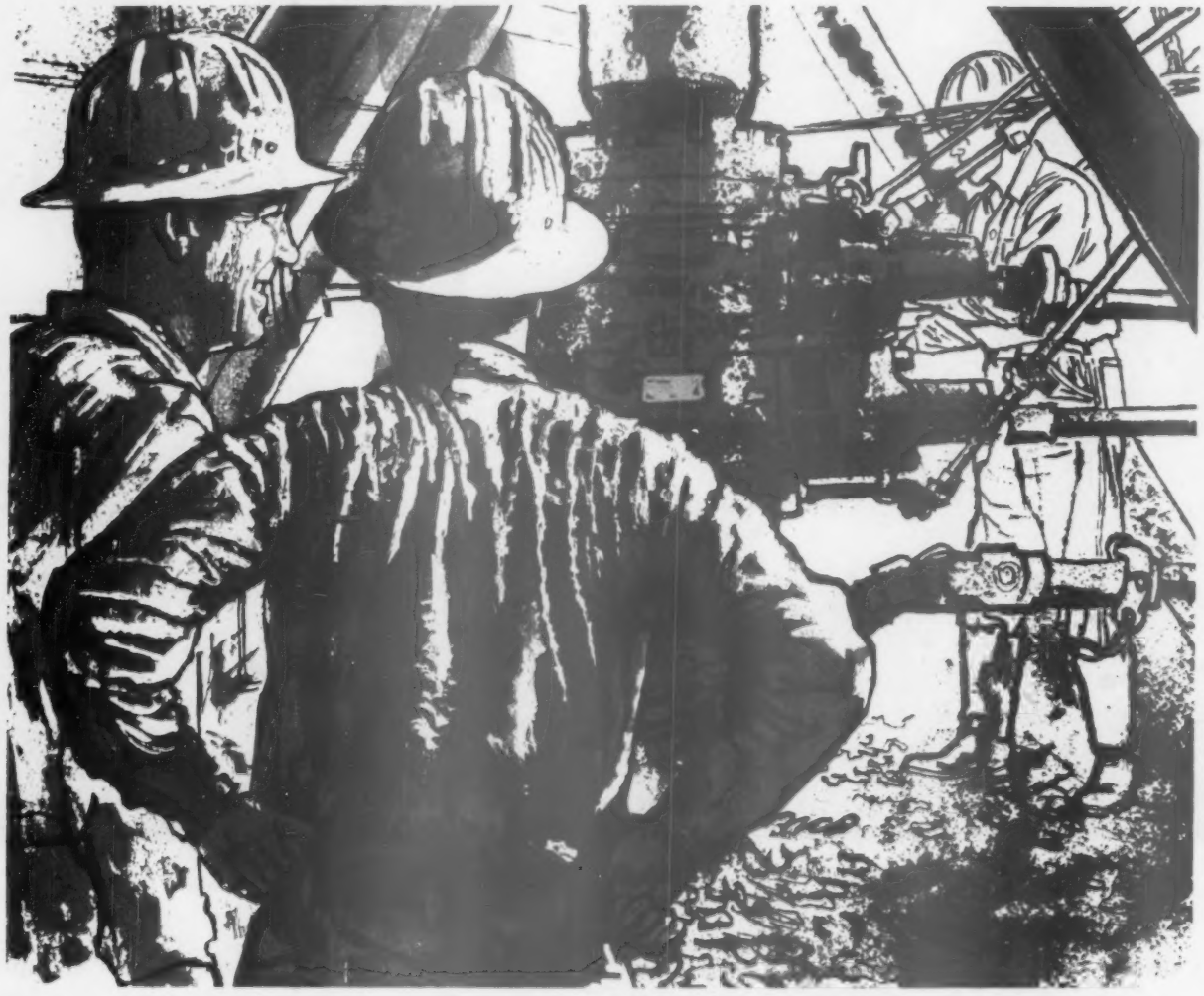
PROTECTION IN DEPTH

How it helps cut compensation costs



How well are your men equipped to handle a blowout?

A well that kicks can be the forerunner to disaster. How swiftly and effectively your crew on tour reacts largely determines the outcome. Are these men trained for a blowout emergency? Liberty Mutual loss prevention engineers help the pusher and drillers in their training program. They check blowout preventers, fire protection equipment and review the emergency procedures.

This thorough check-out is but one of the many Liberty Mutual services that add up to protection in depth. Liberty also helps drillers set up employee health programs, and maintains a loss prevention research center to find solutions to a wide variety of accident problems. When accidents do happen, specialized medical services are available — two rehabilitation centers, a special paraplegic ward, and diagnostic aid from leading orthopedic specialists all across the country.

Last year, protection in depth helped save Liberty Mutual compensation policyholders many millions of dollars. To find out how Liberty's protection in depth can help you save, too, just call the nearest Liberty Mutual office.

Look for more from

LIBERTY MUTUAL

the company that stands by you

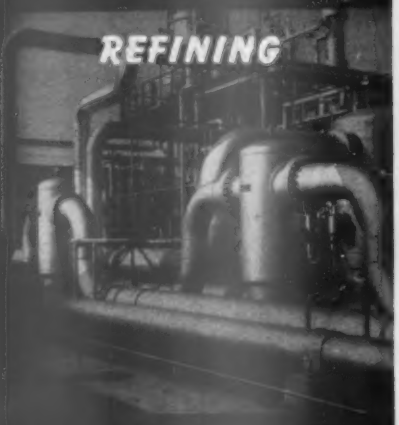
LIBERTY MUTUAL INSURANCE COMPANY • LIBERTY MUTUAL FIRE INSURANCE COMPANY • HOME OFFICE: BOSTON

Personal Insurance: Automobile, Fire, Inland Marine, Burglary, Homeowners • **Business Insurance:** Workmen's Compensation, Liability, Group Accident and Health, Fire, Inland Marine, Fleet, Crime

PRODUCTION

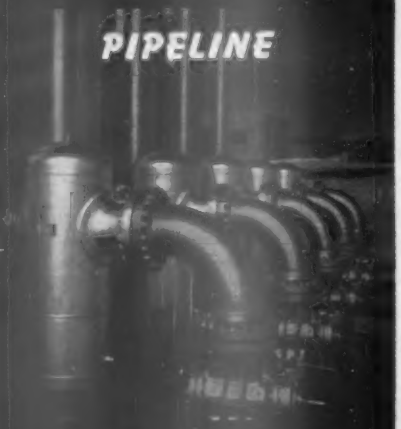
Pictured above is a Peerless Line Separator removing moisture from fuel to drilling rig.

REFINING



These two Peerless Line Separators are doing an efficient job of mist extraction in the Petrochemical plant in Kentucky.

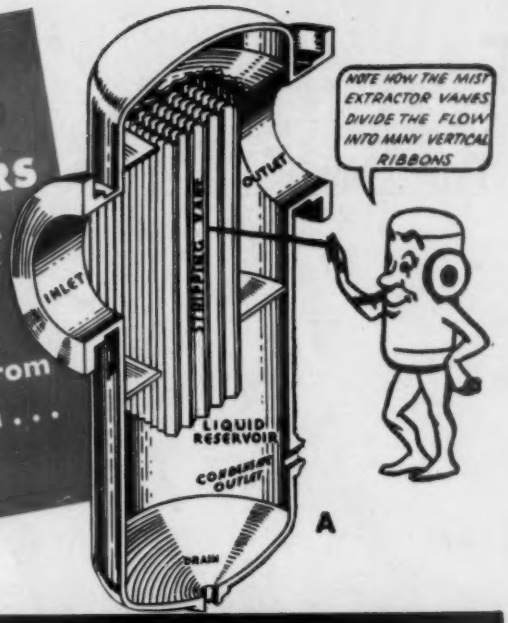
PIPELINE

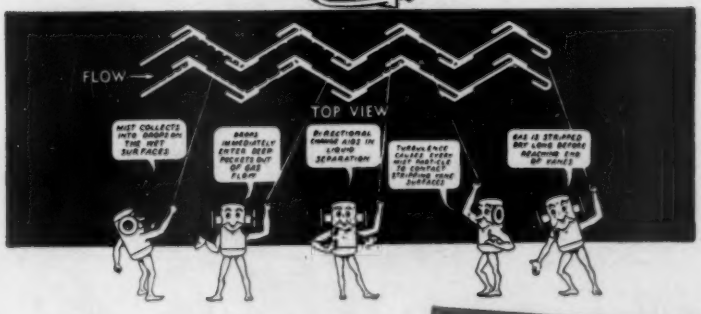


FIVE Peerless Line Separators are shown above as they handle carry over from large scrubbers.

PEERLESS LINE SEPARATORS

Outstanding for the efficient extraction of liquid mist from gas or steam . . .




B
FLOW
TOP VIEW
MIST COLLECTS INTO DROPS ON THE VANE SURFACES
DROPS IMMEDIATELY ENTER DEEP POCKETS OUT OF GAS FLOW
BI-DIRECTIONAL CHANGE AIDS IN LIQUID SEPARATION
TURBULENCE CAUSES EVEN MIST DROPLETS TO CONTACT STRIPPING VANE SURFACES
GAS IS STRIPPED DRY LONG BEFORE REACHING END OF VANES

HIGH EFFICIENCY — HIGH CAPACITY LOW PRESSURE DROP

Thousands of installations throughout the oil industry . . . production, pipeline, refining and petrochemical . . . prove the Peerless Line Separator principle to be one of the most outstanding methods available for the extraction of liquid gas, steam or air.

Drawing A above shows the arrangement of the vanes in the Separator. Drawing B is an illustration of the Peerless Principle.

The mist extractor combines the forces of impingement, centrifugal motion and surface tension to obtain its high efficiency. The path of the gas, etc., through the unit is constantly bending causing semi-violent turbulence and rolling of the gas against the walls of the vane. Impingement and centrifugal force combine to contact the droplets with the vanes, where they coalesce, and surface tension then causes them to cling to the vane's surfaces. Gravity and the impact of the gas steam then drive the droplets into the pockets where they roll down the vanes and out of the gas stream.

Through the Peerless method of mist extraction, the gas is stripped dry long before reaching the end of the vanes.

there's A PEERLESS SEPARATOR FOR EVERY REQUIREMENT

For any capacity
For any working pressure
For corrosive conditions
With removable vane units
With extra body length
With connections for accessory equipment
For pressure drop requirements of less than 6" water
For any vapor-liquid ratio
For any piping requirement

SPECIAL DESIGN SEPARATORS FOR ANY REQUIREMENT

Write today for information on the new color film, "Engineering Makes the Difference," showing various applications of Peerless separators, engineering, testing, and manufacturing facilities.

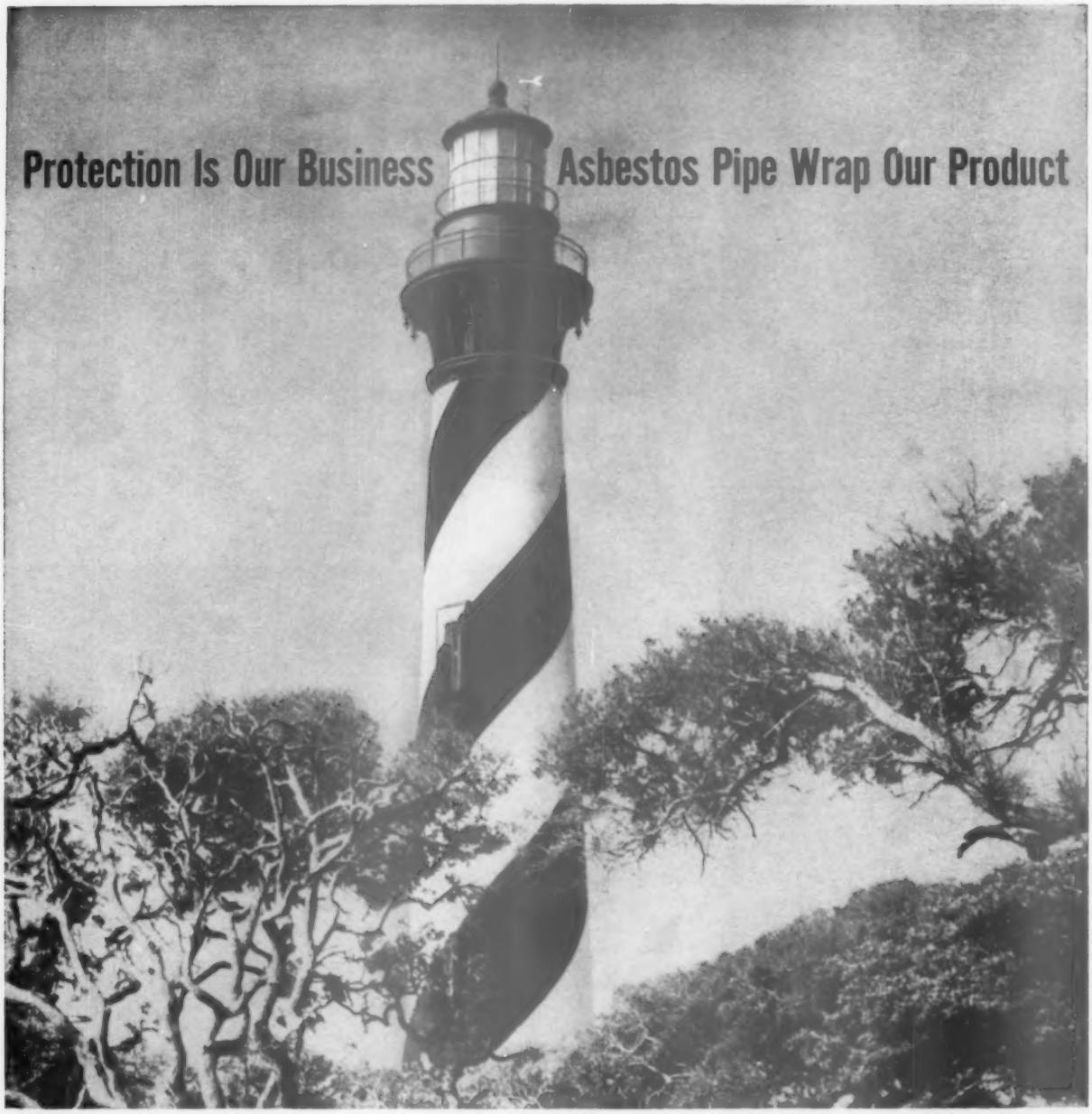
PEERLESS MFG. CO.

"OVER 20,000 SEPARATORS and SCRUBBERS IN SERVICE"

PEERLESS MANUFACTURING CO.

P. O. BOX 13165 ★ DALLAS 20, TEXAS ★ FLeetwood 2-8451

REPRESENTATIVES IN ALL PRINCIPAL CITIES

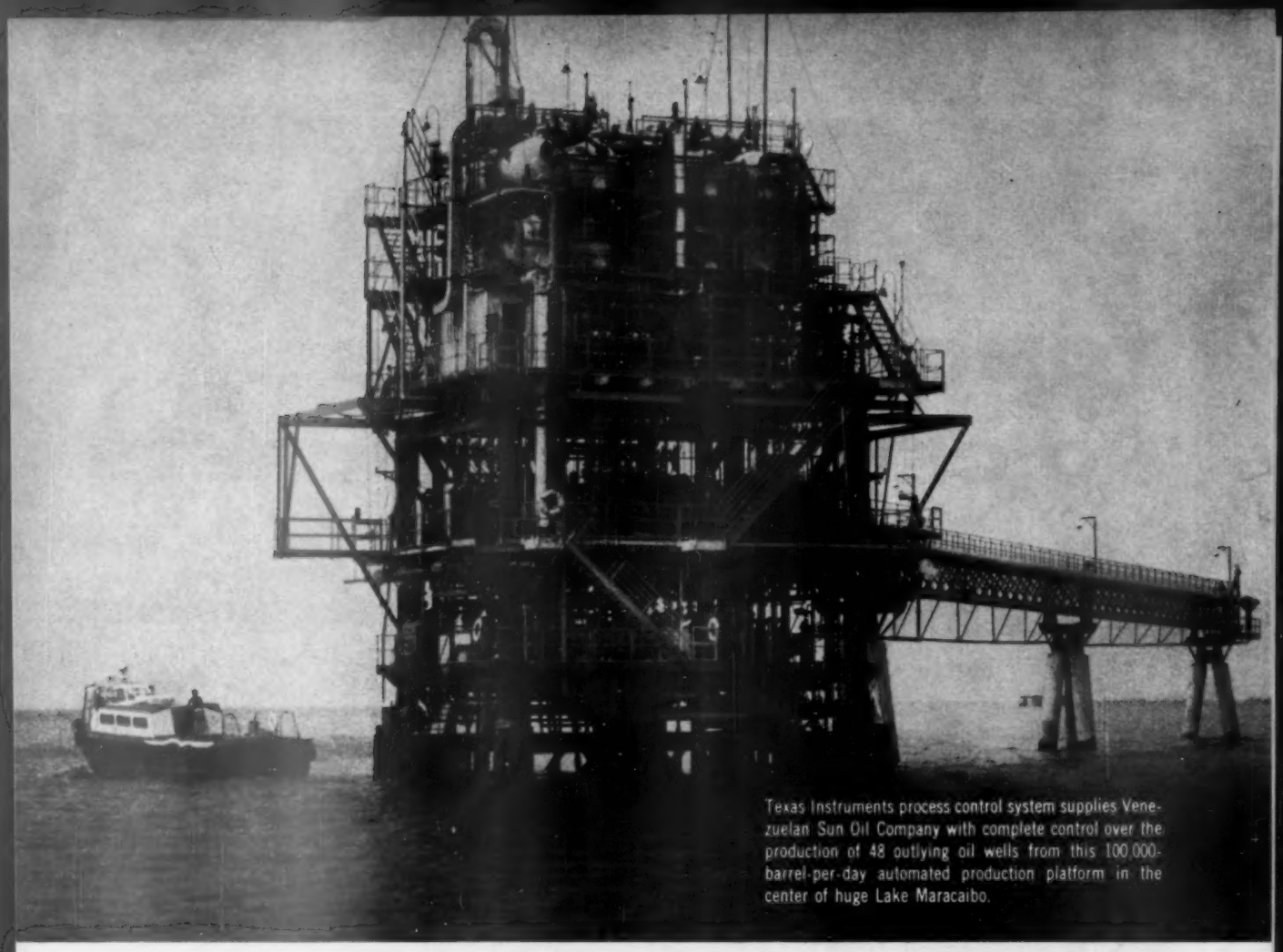


Through complete Quality Control—Nicolet Asbestos Pipe Line Felts have received universal acceptance for their uniformity and absolute dependability. ■ Whether your pipe line requirements demand Nicolet Asbestos #15 "Standard", #8 "Tufbestos" or #10 "Reflecto" (the new, improved, white Asbestos Felt) you are assured of getting the best protection obtainable. ■ And now—the addition of "Old Nic" Glass Wrap to this family of Pipe Wrap products makes Nicolet your best source for complete pipe line protection. ■ "Old Nic" Glass Wrap has uniform porosity which allows hot tar or asphalt enamel to bleed through, while letting hot gas escape, minimizing "holidays". "Old Nic" Glass Wrap will most effectively protect yard wrapped pipe against impact damage. It is equally effective in over-the-ditch operations. ■ **Write today for full specifications and samples of Nicolet pipe protection products.**

Distributed throughout the United States

NICOLET INDUSTRIES, INC.

FLORHAM PARK, NEW JERSEY



Texas Instruments process control system supplies Venezuelan Sun Oil Company with complete control over the production of 48 outlying oil wells from this 100,000-barrel-per-day automated production platform in the center of huge Lake Maracaibo.

isolated command post for 48 oil wells!

This 30 by 40 foot man-made island on Venezuela's Lake Maracaibo — which gathers, separates and pumps 100,000 barrels of crude oil per day — will operate *completely unattended* with an electronic supervisory system designed, built and installed by Texas Instruments.

This automated handling of crude oil production from 48 outlying wells means money savings in operation and maintenance, and maximum production. Since this installation, the producer has ordered TI electronic equipment for two similar flow stations in Venezuela.

The TI process control system monitors flow and pressure from each oil source; monitors and controls all functions of flow station operation, including automatic start-up, shut-down and well testing; and throughout the entire operation logs complete records of production and testing into punched paper tape. In case of a malfunction — for example a pump or engine failure — the system analyzes the situation, takes corrective measures, and sends classified alarm information to the remote monitoring station by radio. A maintenance engineer can then go to the seat of the trouble without repeating corrective measures already taken automatically.

Texas Instruments experience and abilities in petroleum automation systems are being applied in many fields of industrial process control and automation. TI's capacity for design and application of precise instrumentation assures efficient handling of the most complex projects.

Write for more information about Texas Instruments capabilities in the field of process control.

APPARATUS DIVISION
PLANTS IN HOUSTON
AND DALLAS, TEXAS

TEXAS INSTRUMENTS
INCORPORATED
3609 BUFFALO SPEEDWAY
P. O. BOX 66027 HOUSTON 6, TEXAS

TOMORROW HOLDS NO CEMENTING SECRETS

Halliburton Advanced Technology *Anticipates* Your Needs

Development of cementing equipment and materials begins several years in advance of your field requirements at Halliburton . . . thus Halliburton cementing service stands ready to meet your present needs wherever they occur.

Halliburton's intensified research program finds solutions to problems before actual field conditions arise. Halliburton cementing scientists develop different types of cement for various uses, and introduce additives for controlling specific slurry properties. Retarders to help prevent premature setting, lightweight materials to reduce density for lighter cement columns, pozzolans to resist sulphate deterioration, accelerators to speed setting and save rig time . . . these and many others are products of continuing cementing research at Halliburton.

• • •

Pozmix Cement for Weak Formations in Primary Cementing . . . This light slurry, generally used in normal temperature applications, can also be retarded for higher temperatures. Pozmix provides premium properties at less cost since it generally consists of an equal mixture of portland cement and an economical high quality pozzolan additive. This mixture gains strength gradually with stability during hardening to provide *better gun perforating qualities with less shattering.* Pozzolan combines with lime produced when the portland cement hydrates adding strength and hardness for *a better bond.* Lower permeability increases resistance to leaching and corrosion . . . including attack from sulphate water. Pozmix 140 combines pozmix — lime — and set control additives for delayed setting under temperatures from 140° F. to the deepest, hottest wells.

Gilsonite Cement for Controlling Circulation Loss in Problem Formations . . . This granular material adds volume but not weight to produce slurries weighing as low as 10 lb. per gal. for successful cementing in cavernous, porous, or extremely weak formations. Halliburton selected the right particle size distribution for maximum bridging. The scouring action of the angular Gilsonite particles also helps remove mud cake for a more secure bond. Gilsonite absorbs less water than other light weight materials, giving the cement a relatively high compressive strength. This inert substance resists corrosive attack and has little affect on cement thickening time. Less Gilsonite is ordinarily needed in lost circulation zone cementing resulting in greater economy.

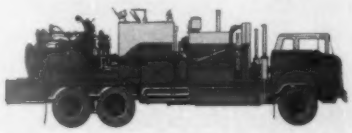
Latex Cement for forming a film for lower fluid loss in primary, squeeze, liner and tail-in cementing in lower temperature formations. The greater resiliency from Latex Cement can help prevent shattering or cracking from bullet perforating, and provides excellent bonding characteristics between the pipe and formation. The additive forming Latex Cement, Halliburton LA-2, contains synthetic latex and additives which increase the emulsion stability of the slurry to agitation and foaming. It also gives high resistance to acid and other well fluids when mixed with Portland or Hi-Early cements.

Silica Flour for stabilizing or improving cement compressive strengths and maintaining low permeability from 230° F. to the hottest wells. Portland cements show drastic strength retrogression when subjected to high temperatures, and silica flour has shown impressive results in the field counteracting these effects chemically. Silica Flour is compatible with all commonly-used cements and additives.

HR-12 Retarder is a Breakthrough for early Strengths in deepest, hottest holes . . . This organic compound gives adequate pumping times, minimum waiting-on-cement times, and provides excellent early strengths by retarding cement compositions under the highest static temperatures presently encountered. Laboratory tests show that HR-12 can serve effectively up to 500° F.! It disperses well so that additional mixing water, which could weaken cement, isn't necessary. HR-12 Retarder is compatible with API Class D and E cements, Pozmix and Pozmix 140 . . . and many additives.

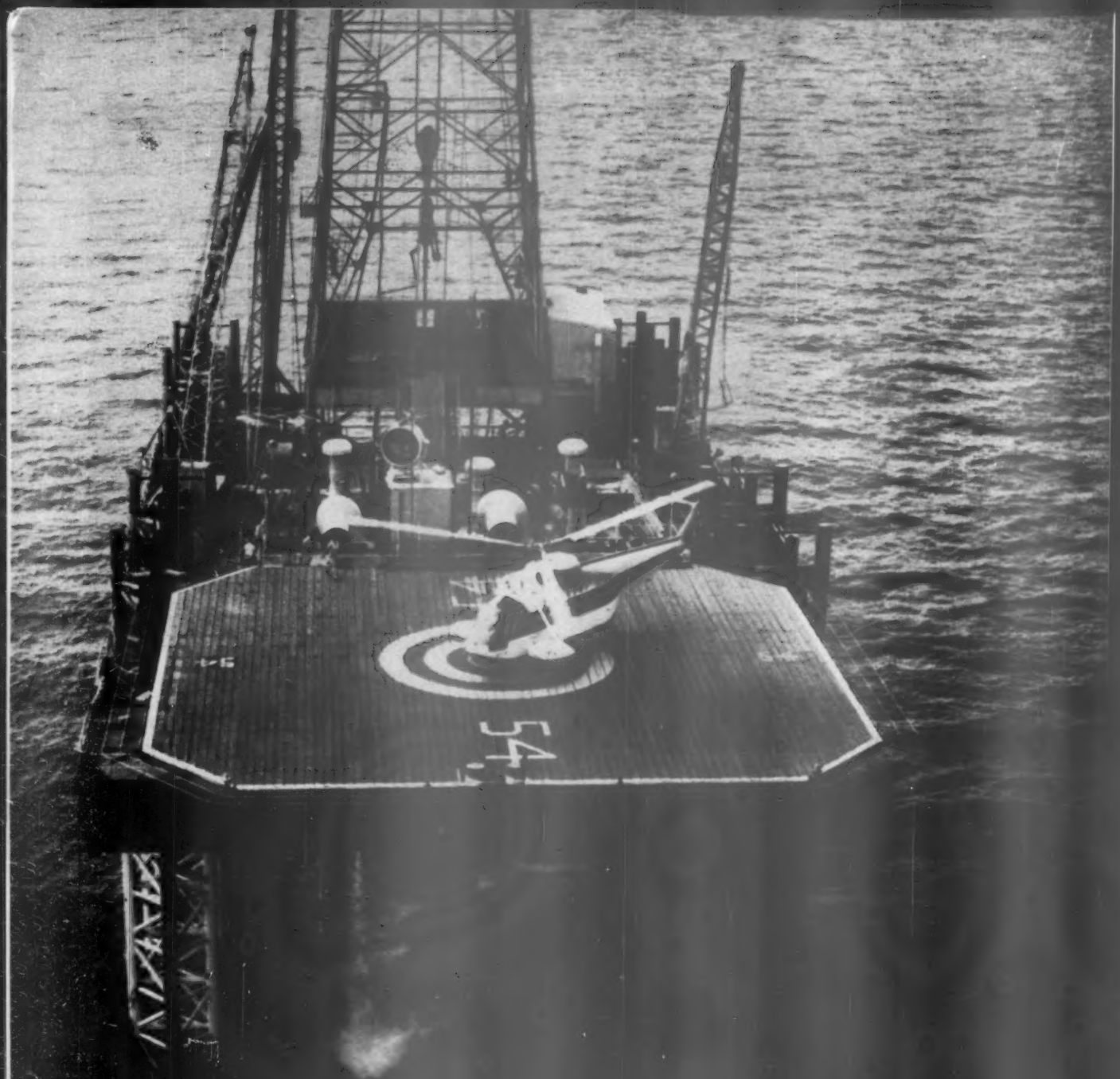
HA-5 Accelerator to Reduce Waiting-On-Cement Time . . . This latest accelerator for cements can produce high early strength in cement on shallow wells and surface pipe – even in cold weather cementing. Adding two to three percent HA-5 to the dry cement or mixing water gives *maximum acceleration*, usually reducing waiting-on-cement time to about 4 to 8 hours depending on the cementing composition strength desired at the time of drilling out. This improved accelerator functions in API Class A and Pozmix Cements.

275 Service Centers . . .
just minutes away from your well



CEMENTING SERVICES

Halliburton
COMPANY • DUNCAN, OKLAHOMA



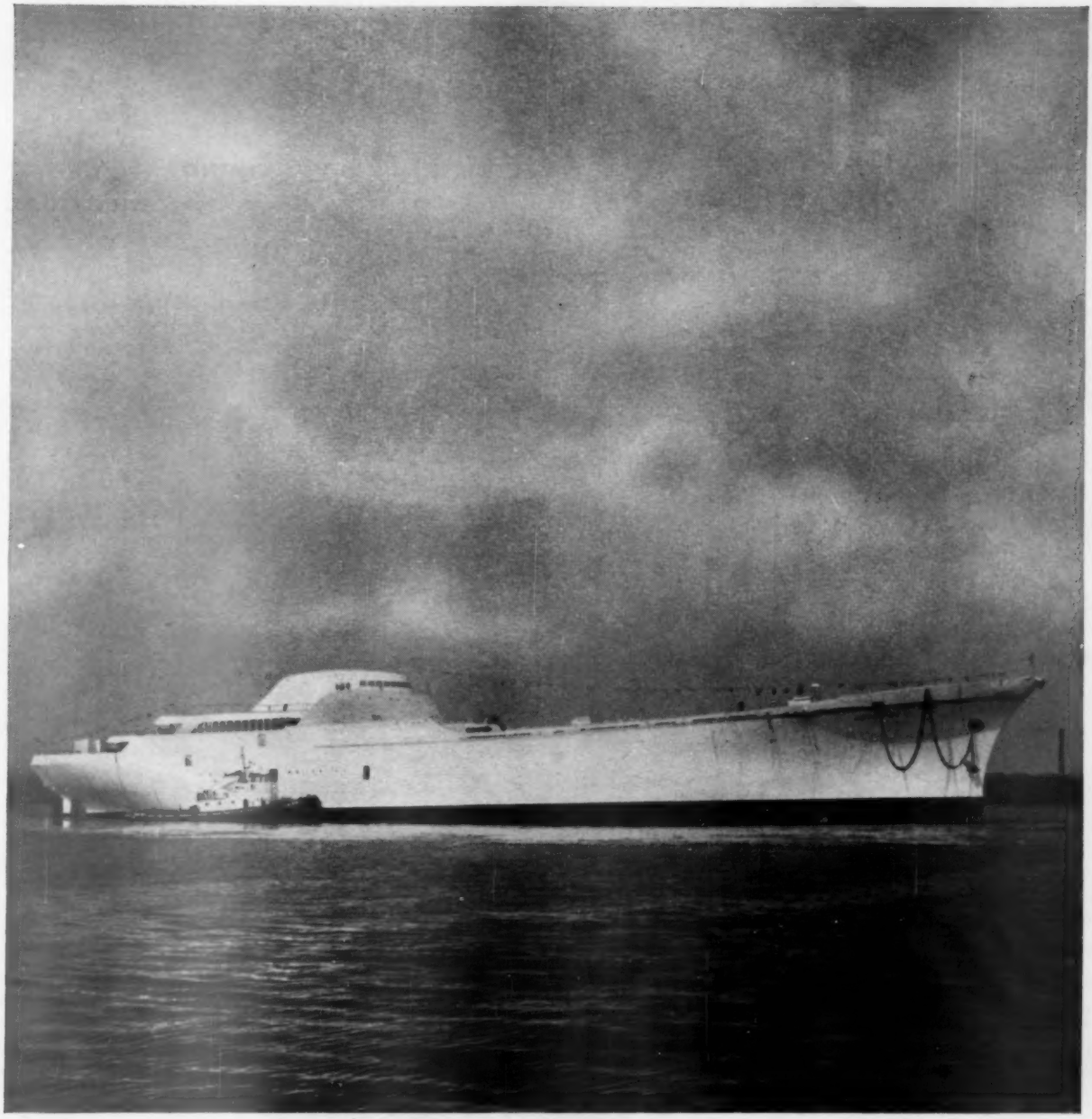
TURBOCOPTERS COME TO THE GULF

The turbine powered flying "crew boat" you see above is a Sikorsky S-62 operated by Petroleum Helicopters, Inc. in the Gulf of Mexico. First helicopter to offer the over-water safety of a boat hull, the S-62 operates equally well from land or drill rig. Its smooth, quiet turbine engine offers passenger comfort, speed and reliability never before available. It flies an 11-man crew change 75 miles out to sea—once a 12-hour boat trip—in just 40 minutes. Crews arrive at the rig fresh, relaxed, ready for work. The S-62 cruises at 100 miles per hour... flies close to three hours without refueling. Learn more about the remarkable economies and operating features of the boat-hulled Sikorsky S-62. A note on your letterhead will bring you complete information.

UNITED AIRCRAFT CORPORATION

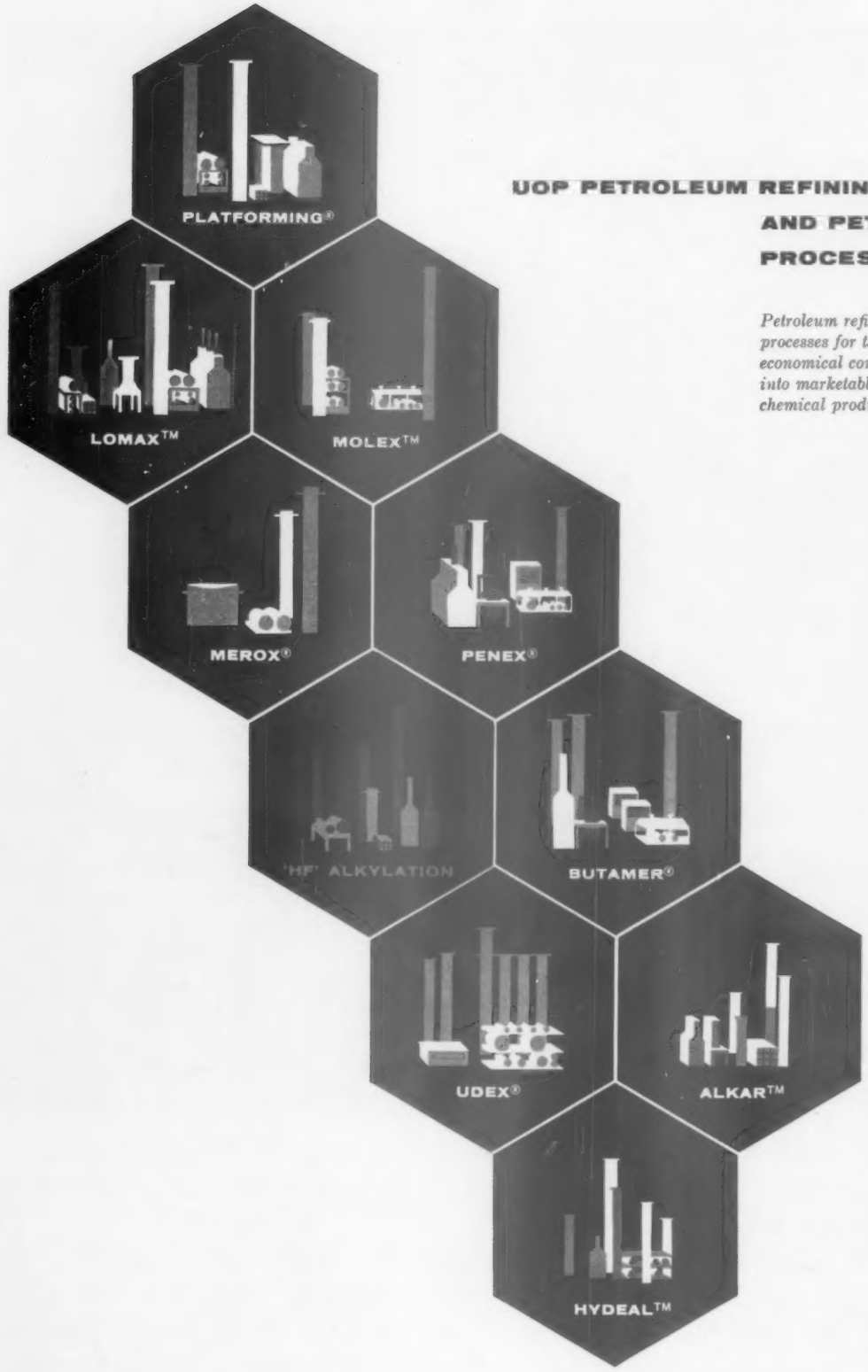
SIKORSKY AIRCRAFT DIVISION

Stratford, Connecticut



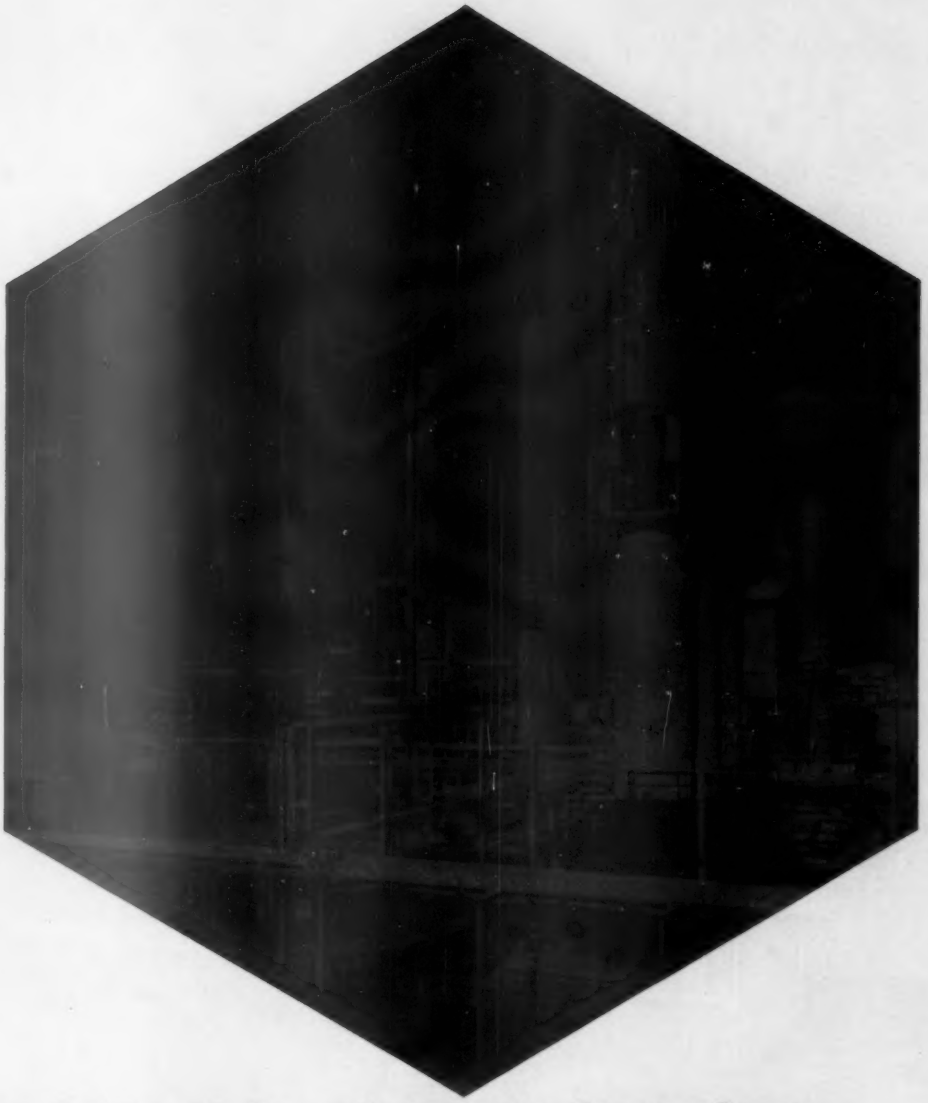
World's first nuclear-powered commercial vessel, N. S. Savannah, to be lubricated by Texaco. States Marine Lines, operators of the vessel after her commissioning early in 1962, have awarded the lubrication contract to Texaco—and for good reason. Extensive study of the Savannah's lubrication demands was conducted by Texaco's million-dollar radiation laboratory—the most fully-equipped, privately-financed research facility of its kind in the oil industry. These studies proved the ability of Texaco Marine Lubricants to withstand radiation. Striking evidence of Texaco product performance, this is also evidence of Texaco's many diversified investments in providing oil for energy for the Free World.

TEXACO: SYMBOL OF WORLD-WIDE PROGRESS THROUGH PETROLEUM



UOP PETROLEUM REFINING AND PETROCHEMICAL PROCESSES

Petroleum refining and petrochemical processes for the efficient and economical conversion of petroleum into marketable fuel and chemical products.



now blend in cleaner burning, highest octane components

"HF" ALKYLATION gives refiners a blending component that combines the ideal qualities of a clean burning fuel that gives smooth engine performance with high octane number. Often refiners find themselves pushed into an economic corner in producing gasolines that burn clean, efficiently, and give maximum power. "HF" Alkylation is a catalytic process that produces an isoparaffinic fuel component that burns with a minimum of carbon deposit . . . greatly reduces surface ignition and consequent rumble . . . and is ideally suited to the auto engine of today.

The UOP-developed "HF" Alkylation process combines olefins such as propylenes, butylenes and amylenes with an isoparaffin, usually isobutane. The product formed, alkylate, is a mixture of branched chain hydrocarbons of higher molecular weight. It is widely used in producing high octane aviation gasoline, as well as an anti-rumble component in motor fuel.

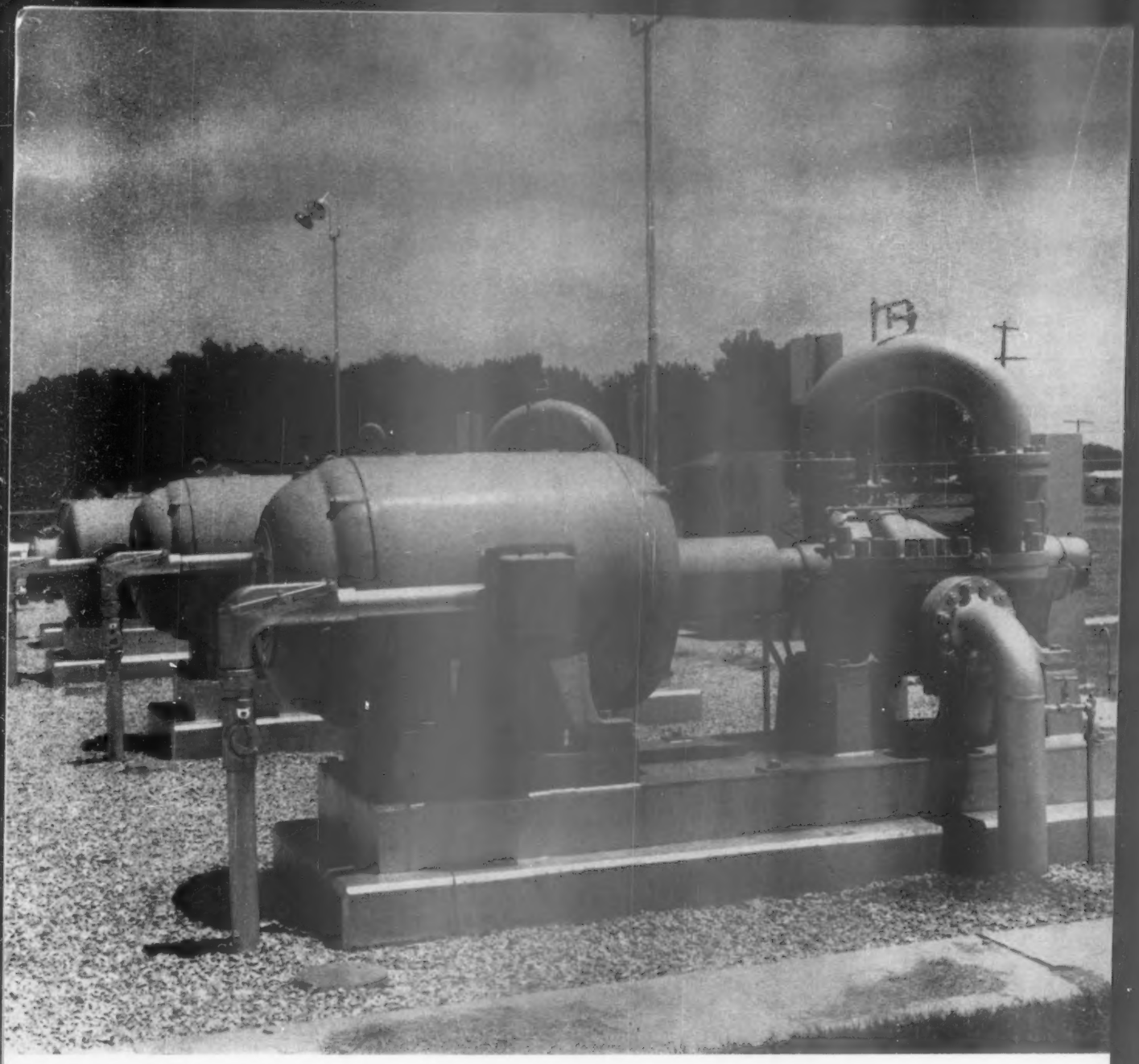
UOP also offers Sulfuric Acid Alkylation for special situations where the refiner's economic, supply, or production situation may give this process a greater profit potential.

With more than a score of different processes UOP can offer you the most profitable method for the processing of petroleum. Let UOP engineers evaluate your processing needs now.

WHERE RESEARCH IS PLANNED
WITH PROGRESS IN MIND

UOP

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U.S.A.



And these 1,650 horses pumped happily ever after on U. E. P.*

***. . . Utility Electric Power, of course . . . another example of economical conversion to dependable, compact electrical operation.**

In converting this mainline crude oil station to efficient purchased electric power five electric motors totaling 1,650 horsepower were applied. Electrification is complete even to the 8 electrically operated valves. Consult your local Utility Electric Power Company today about converting your operation.

Petroleum Electric Power Association

P. O. Box 35006 • Dallas 35, Texas

List of P. E. P. A. members will be furnished on request.

PUMPING

WATERFLOODING

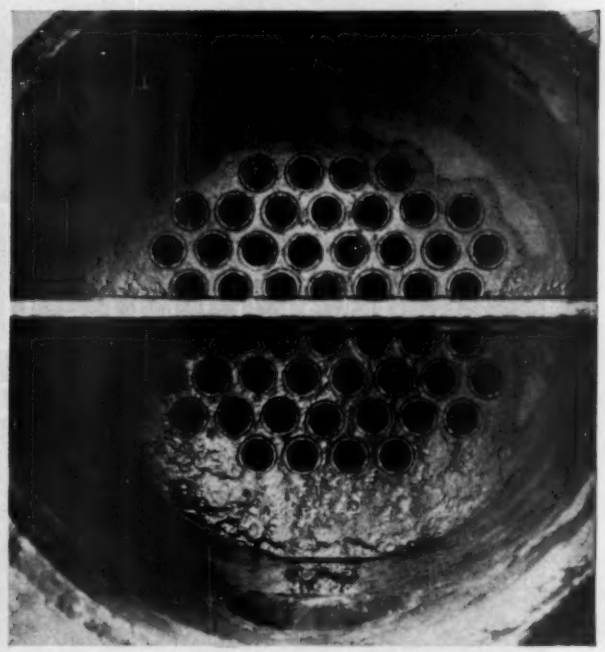
GATHERING

PIPELINES

REFINING

Descale equipment quickly, safely —without dismantling!

BEFORE—This condenser was badly clogged with hard-water scale. Mechanical cleaning of the tubes would have been difficult, time-consuming and costly. To use hydrochloric acid would pose danger to nearby equipment and personnel.



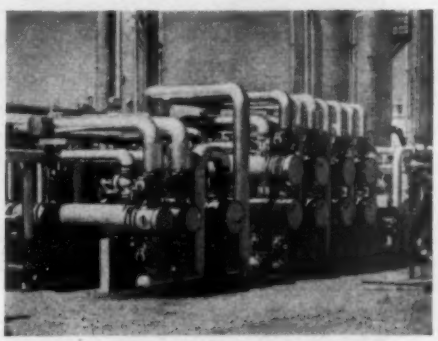
AFTER—It was easily cleaned *without dismantling* by circulating a water solution of a sulfamic acid-based cleaner for an hour. Short downtime, *no* danger to equipment and complete safety for personnel!

Use a dry-acid cleaner based on Du Pont Sulfamic Acid

They're effective. Dry-acid cleaners dissolve most water-side deposits found in condensers, boilers, compressor jackets, heat exchangers, etc. Yet they're much less corrosive to metal than hydrochloric-acid cleaners.

They're easy, safe. Just dissolve the solid cleaner in water and circulate through the equipment. No danger of broken carboys, spilled liquids or toxic fumes—glasses and gloves are the only protective clothing needed!

They're economical, fast. 1 lb. of dry cleaner does the job of 1.3 lb. of 28% hydrochloric acid—you save on shipping, handling, storage and downtime (because there's no dismantling).



Various types of refinery equipment, like these heat exchangers, are easily descaled with a cleaner based on Du Pont Sulfamic Acid. The equipment is cleaned *in place* with a minimum of downtime.

Ask your water-treatment company's technical representative about dry-acid cleaners; chances are, he can supply you. Or send the coupon for booklet and names of formulators offering dry-acid cleaners based on Du Pont Sulfamic Acid.

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Industrial and Biochemicals Department, N-2545OG
Wilmington 98, Delaware

Please send your "Descale" booklet and names of formulators offering cleaners based on sulfamic acid.

*Name*_____

*Company*_____

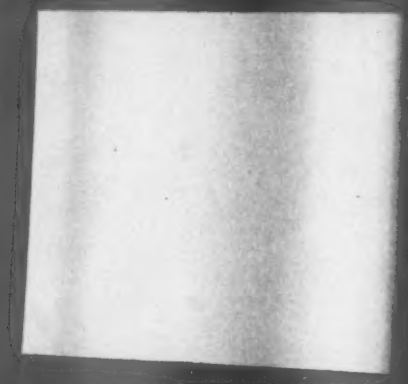
*Address*_____

*City*_____ *State*_____

US RUBBER

ROYAL MASTER

ROTARY DRILLING HOSE



Any US Oil Equipment Distributor can show you why U.S. Royal Rotary Drilling Hose exceeds top API specifications—outperforms all other rotary hose.

New Master of the Oil Field

The world's strongest, toughest, longest lasting rotary hose has long been made by US. And now, *more than ever*, U.S. Rubber leads the industry.

The new U.S. Royal Master, built on the same unique 4-ply, single-wire principle that made the U.S. Royal 4 unquestioned leader in the field, brings rotary hose to an entirely *new* level of performance. It promises rig operators everywhere a degree of drilling efficiency and economy that has never before been approached.

And that promise is already being fulfilled, as the new U.S. Royal Master—extensively field tested *before* its introduction—is now at work on rigs everywhere, offshore, inshore, and inland. Its trouble-free performance under even the most adverse drilling conditions gives clear evidence that the super-premium-quality U.S. Royal Master is the most truly economical hose ever made, for any drilling pressure, any drilling medium.

At the same time, the U.S. Royal 4, the most acclaimed hose in oil field drilling history, continues to demonstrate the outstanding performance that made it the four-to-one favorite after its introduction more than ten years ago. Especially at its new, non-premium price, the U.S. Royal 4 represents a performance-to-cost ratio second only to the great new U.S. Royal Master.

Why settle for less than the most efficient, most economical hose on the market? The U.S. Royal Master and the U.S. Royal 4 are available at field stores everywhere.

Tattered and torn, but still delivering mud for the Chiles Drilling Company after more than *six years* of punishing service, this U.S. Royal 4 finally had to be replaced. Naturally, the replacement was another U.S. Royal Rotary Hose. See why U.S. Royals consistently outperform other rotary hose on wells everywhere. Make your next rotary hose a Royal and enjoy the true economy of superior quality.

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

United States Rubber

MECHANICAL GOODS DIVISION

Rockefeller Center, New York 20, N. Y.

THESE PUMPS REACH DEEP TO DELIVER SECONDARY RECOVERY SOURCE WATER AT ROCK BOTTOM COST

PEERLESS PUMP

On almost continuous duty, at settings ranging from 30′ to 1400′ these Peerless Vertical Line Shaft Pumps drastically reduce water flood expenses . . .

Whether your source water is shallow or extremely deep, the Peerless vertical line shaft pump is the ideal pump for a steady dependable flood water supply. That's because it is big enough to do the job—up to 15,000 BPD from well depths to 2,000 feet; it is flexible enough to fit any water flood project; and it has been proved on the job over periods of up to six years of continuous flood water supply service.

Moreover, Peerless vertical line shaft pumps are specially built for the rigorous duty of handling corrosive fluids encountered in flooding operations. An informative bulletin B-102 on these pumps is available upon request. Write for your copy now.

Putting Ideas to Work

fmc

PEERLESS PUMP

HYDRODYNAMICS DIVISION

Plants: Los Angeles 31 California, and Indianapolis 8, Indiana.

Offices: New York; Detroit; Chicago; Cleveland; Indianapolis; St. Louis; San Francisco; Atlanta; Plainview; Lubbock; Phoenix; Albuquerque; Los Angeles; Fresno.

Distributors in principal cities.
Consult your telephone directory.

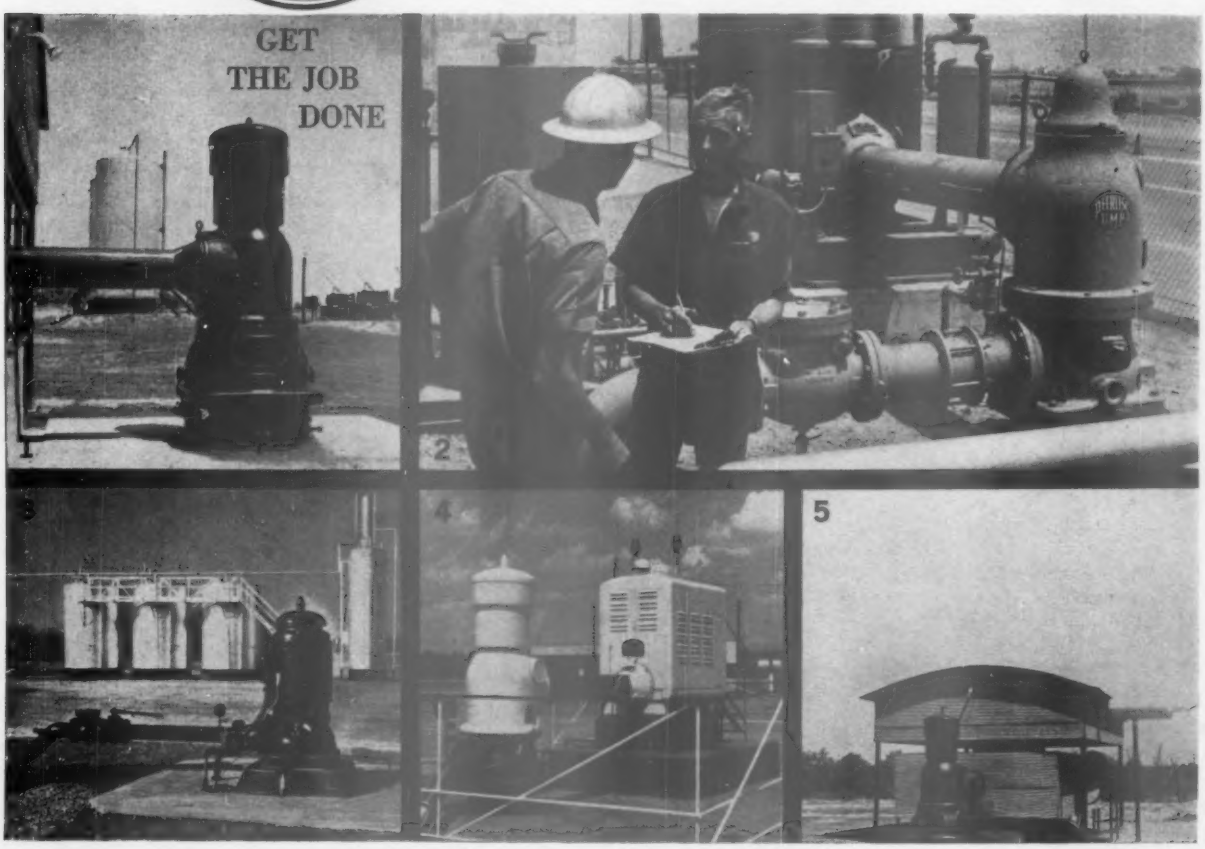
1 These pumps were installed when other water lifting pumps proved extremely costly to maintain. Embodying custom features in a production pump, these units afforded owners immediate cost savings that will soon repay original purchase price.

2 Peerless line shaft pumps are extremely flexible. They are adaptable to all types of drives. In this installation, the engine driven pump is providing an efficient flow of flood water for the Richfield Oil Company at Long Beach harbor field.

3 Power savings of $1,200 per month per pump were realized when four Peerless deep setting vertical line shaft pumps were chosen to replace obsolete methods. Pumping 15,000 BPD each, these pumps have proven most economical and dependable.

4 Producing 5,000 BPD from a 1400′ setting, this pump is one of four in service on a 4500 acre water-flood project in the Crescent Field, Logan Co. Oklahoma. Use of natural gas engine saves expense of electrical power sources.

5 This is one of four Peerless units in the Sholem Alechem field Stephens Co., Oklahoma. Using natural gas fuel, these pumps have delivered over 50 million barrels of water at a cost of less than 2 mils per barrel. This cost is 1/5 of that experienced by pumps using electricity for power.



Coming to the chemical show—Visit us in Booth 831

Photograph courtesy of Standard Oil Company (N. J.)

Why Nickel Steel Pipe Keeps Fishing Tools on the Shelf

The deeper you drill, the greater the possibility of drill-pipe failure. Torsion, tension and fatigue—they all increase with each additional foot of hole.

But AISI 4340 nickel steel has the muscle to keep your drill pipe on the job when other materials quit.

Yield strengths as high as 105,000 psi and tensile strengths as high as 150,000 psi are provided by AISI 4340. When drill strings are long and heavy, this added strength prevents many a drilling crew from "going fishing."

A bar of AISI 4340 (1⅛" diameter) resists 130,000 psi in torsional stress when it's oil quenched and tempered at 1200° F. And this helps to prevent failure in a 100-200-ton string of drill pipe.

With each added length of drill pipe, bending stresses tend to increase. But AISI 4340 nickel steel, hardened and tempered, provides a fatigue strength of 75,000 psi at 4 million cycles—enough to keep your string going down without downtime.

For deep-hole drilling—12,000 feet and more—AISI 4340 provides an outstanding combination of ductility, toughness, and strength. In the heat-treated condition, it's shock- and impact-resistant, wear- and abrasion-resistant.

With such excellent properties, it's no wonder that AISI 4340 is such good insurance against drill-pipe failure in deep holes.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street INCO New York 5, N. Y.

INCO NICKEL

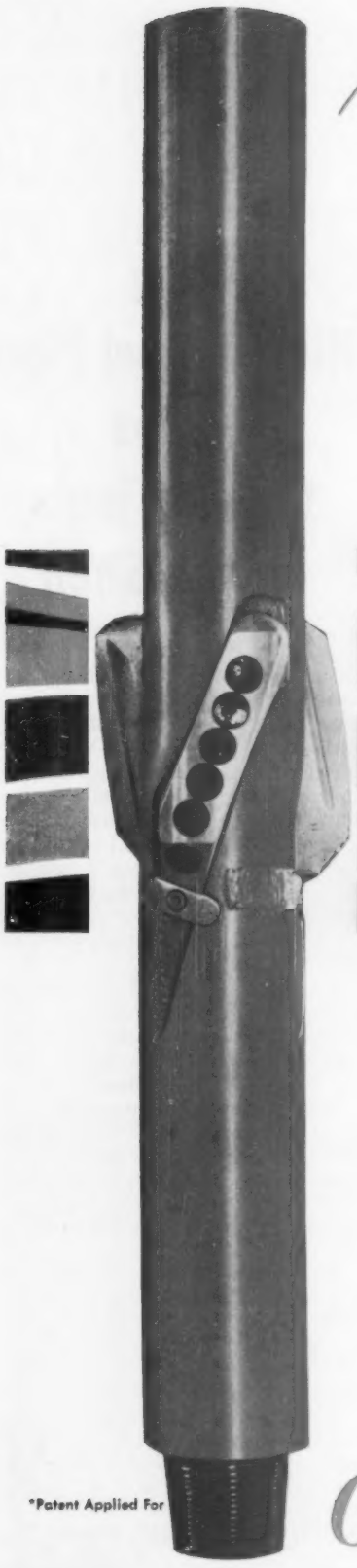
NICKEL MAKES STEEL PERFORM BETTER LONGER

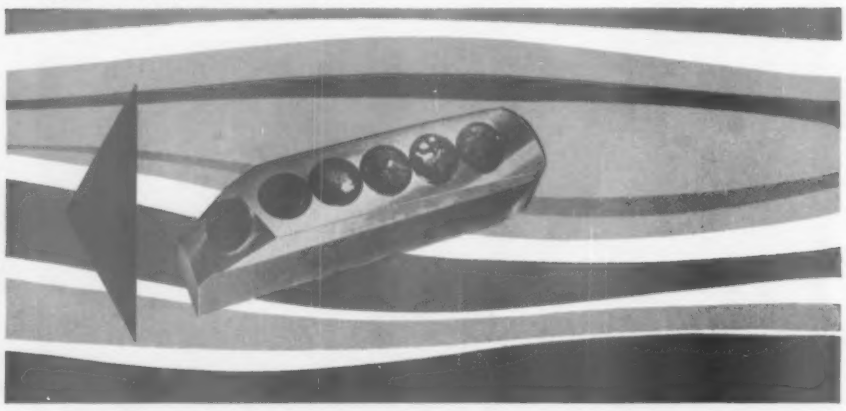
New Safety... New Economy...

from GRANT in the

BUTTON DRILBLADE STABILIZER!

Now—to the *economy* of drill string stabilization with Grant detachable blade stabilizers—you can add *greater safety than ever before.*





Grant's entirely new concept in blade design is this all-new Button Drilblade* of forged and heat-treated aluminum with press-fitted, individually hard-faced, mild steel inserts. ***It cannot break off or come loose in the hole.***

Longer downhole life of the all-new Button Drilblade is achieved by thicker application of tungsten carbide, made possible by the cupped design of the insert heads. Also, a new type of rod delivers a higher percentage of the hard metal to the bearing surface.

Tensile strength and density of the forged aluminum blade body is further strengthened by the press-fitted steel inserts. Thus, neither the blade nor the inserts can work loose or break off. Yet the blades are easily washed over. Drilblades are retained in the Stabilizer body by tapered slots, engineered so that the blade is actually tightened during use, and by Double-Safety Lock Plates. Removal of Lock Plates permits the blades to be easily changed on the rig floor.

The Grant Drilblade Stabilizer—already the preferred tool for directional drilling all over the world—is now the most dependable tool available for this work.

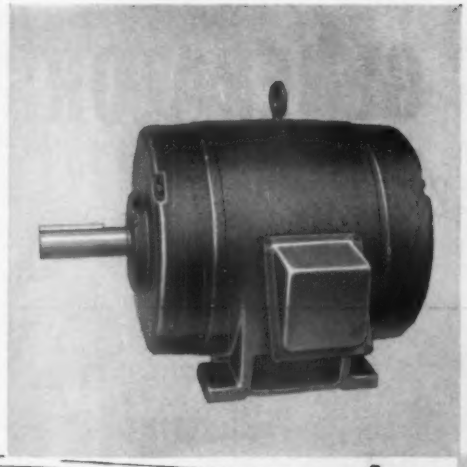
The new Button Drilblade is fully interchangeable with Grant standard blades. It is available in all body sizes 'round-the-clock from your Grant service man—or write Grant direct for specifications and prices.

*Patent Applied For

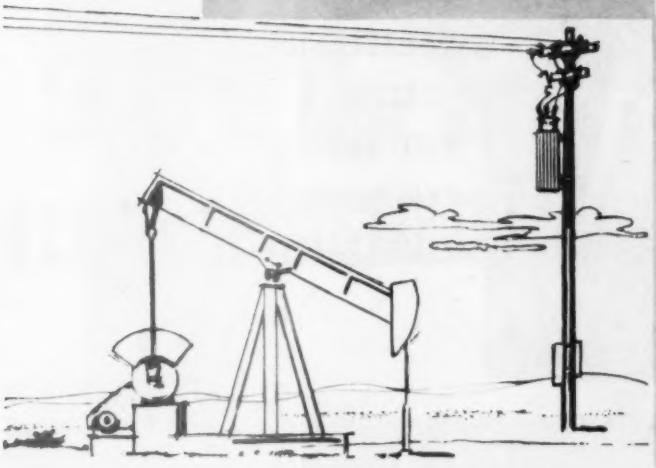
GRANT OIL TOOL COMPANY

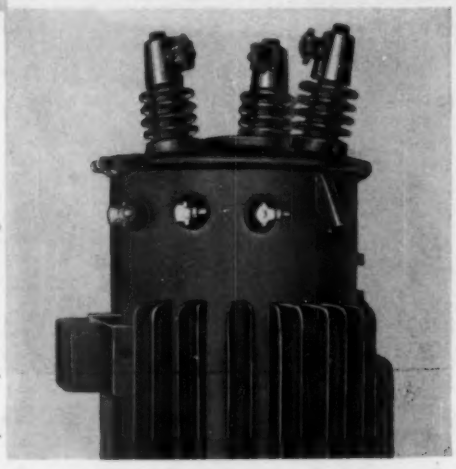
2042 EAST VERNON AVENUE, LOS ANGELES 58, CALIFORNIA • Cable Address: GRANTOOL

DISTRICT OFFICES AND WAREHOUSES: *Bakersfield, Compton, Ventura, Woodland, Calif. • Liberal, Kan. • Harvey, Houma, Lafayette, La. • Laurel, Miss. • Farmington, Hobbs, N. M. • New York, N. Y. • Ardmore, Oklahoma City, Okla. Corpus Christi, Houston, Kilgore, Odessa, Tex. • Casper, Wyo. • Edmonton, Pincher Creek, Ft. Nelson, Canada Representatives in Argentina, Brazil, France, Italy, Middle East, Mexico, Venezuela*



MONEY-SAVING MATES





matched Wagner® motors and transformers that push down oil well pumping costs

...and keep them down. For you can pump better electrically, and this pumping package lets you electrify leases by bringing the high voltage line directly to each well installation, operate each well individually. The lightweight, pole-mounted transformer is matched to its motor load... puts an adequate, dependable power supply close to the load. You get a more orderly and flexible system layout. You save up to 25 percent in materials and labor, eliminate many dead ends, get better lightning protection, and reduce system losses by as much as 65 percent.

The Wagner® motor is engineered for oil well pumping, and only oil well pumping. Nothing else. Because it is designed with high torque and high slip for this specific job, the motor consumes fewer kilowatts per barrel pumped... saves in initial investment and in operating costs. Built in ratings of 5 hp and larger.

Your Wagner Field Engineer can give you the complete story of this cost-cutting pumping package, and help you plan oil well pumping, gathering and water-flooding systems. Call him now, or write for Bulletin EU-426A.

Branches and Distributors in all Principal Cities

Wagner Electric Corporation

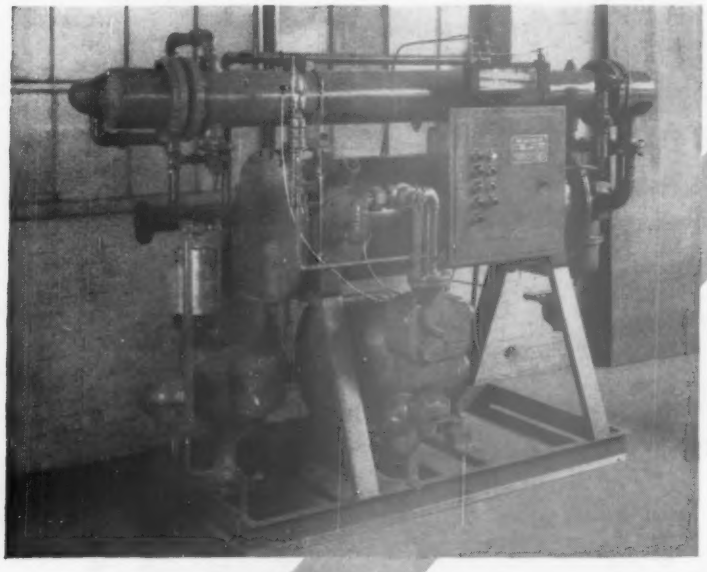
6389 PLYMOUTH AVENUE, ST. LOUIS 33, MO., U.S.A.

WM61-11

SERVING 2 GREAT GROWTH INDUSTRIES—*ELECTRICAL* • *AUTOMOTIVE*

KEMP INERT GAS GENERATORS

give you 4 basic advantages!



FOR BLANKETING
AGITATING
O_2 EXCLUSION
PURGING
FIRE AND
EXPLOSION
ATMOSPHERES

1 **Constant analysis** is automatic due to the exclusive Kemp Carburetor that pre-mixes gas and air in precisely the ratio you desire . . . maintains it regardless of total demand or pressure fluctuation in the supply line.

2 **Easy start-up** is yours with Kemp Carburetor and external test burner. You test the pre-mixed gas-air ratio *before* it enters the combustion chamber. And electric ignition gets your Kemp Generator off to a time-saving, labor-saving start.

3 **Safety controls** effectively end flame-out danger. Kemp's electronic flame failure control instantly and automatically cuts off gas supply to the carburetor. Moisture and combustion chamber pressure cannot affect this control.

4 **Set it—forget it.** Once you've set the vernier dial on your Kemp Generator you can walk away and forget about it. Kemp's exclusive carburetor keeps your exact gas-air ratio coming hour after hour—as long as you wish—without further checking or manipulation of controls.

SEE THE MAN FROM KEMP

He is equipped and qualified to advise you on any size and type of generator you may require . . . can also counsel you on dryers and compressors for inert or nitrogen generation systems and heaters. See your C.E.C. Catalog for full listing of Kemp representatives in your area or check your local telephone book. For details on Kemp Inert Gas Generators, write for Bulletin I-10.

It always pays to come to

KEMP OF BALTIMORE

THE C. M. KEMP MANUFACTURING COMPANY
405 E. Oliver St., Baltimore 2, Md.

STRAIGHT TALK

ABOUT SIDE ENTERING MIXERS...

There's only one reason for buying side entering mixers: to blend low viscosity liquids in large tanks . . . and keep them blended. A side entering mixer is a simple piece of equipment . . . yet it must be dependable, and properly designed for the job to be done. Put together a propeller, shaft, and mixer drive assembly *specifically designed for the application*—and an electric motor of adequate horsepower—and you have it.

We make these mixers, and we'll tell you—there's no hocus-pocus in this kind of mixing. Results depend solely upon the amount of torque applied by a standard marine propeller.

Economy and long life? These result only from careful manufacture and precise matching of *all* components. We don't merely adapt parts designed for other purposes —we are the *only* major mixer manufacturer to design and build *every* part of a side entering mixer for the specific job it must do.

Install It—Then Forget It. A Philadelphia Side Entering Mixer is as trouble-free as an agitator can get—simple, sturdy, dependable. Take the shaft seal: it's dependable, durable, secure—and you can replace it in minutes. For reliable month-after-month, year-after-year operation, specify Philadelphia.

AVAILABLE IN ONLY ONE DESIGN—
THE BEST THERE IS

- Designed for Motors from 1 to 50 HP
- Precision-Hobbed Gears
- Positive Shut-Off Collar
- Highest Gear Ratings
- Durable, Dependable Shaft Seals

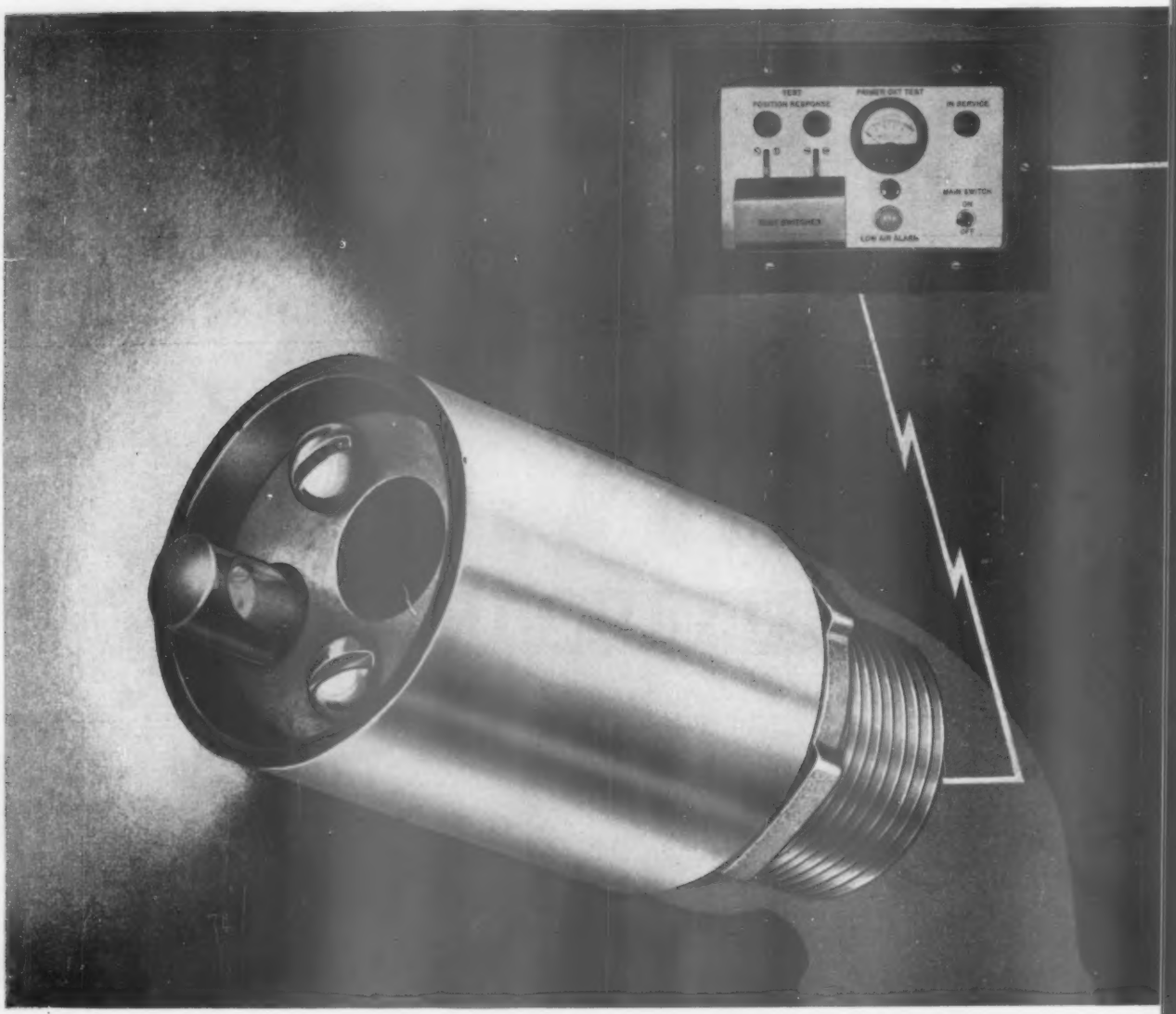
Ask Philadelphia engineers about mixers *and* mixing . . . request 12-page Bulletin PSE-60 on your letterhead today.

PHILADELPHIA MIXER

DIVISION OF PHILADELPHIA GEAR CORPORATION
King of Prussia (Suburban Philadelphia), Pennsylvania

ASK ANY ENGINEER / GEARS ARE THE HEART OF A MIXER

AGMA MEMBER



NEW! SPEED-OF-LIGHT FIRE DETECTION WITH GRINNELL'S NEW PRIMAC®

New Grinnell system detects fire in milliseconds . . . offers ultra-high-speed protection where solid propellants, other materials present special hazards

Manufacture and use of solid propellants present special fire hazards. Fire protection must be ultra *fast*, if it's to be effective!

Grinnell's Primac fire-control system operates in milliseconds. A photosensitive cell picks up the first light from a fire . . . transmits a signal that actuates the new Primac water-control valve

PLUS FASTEST-ACTING SPRAY PROTECTION FIRE-CONTROL SYSTEM*

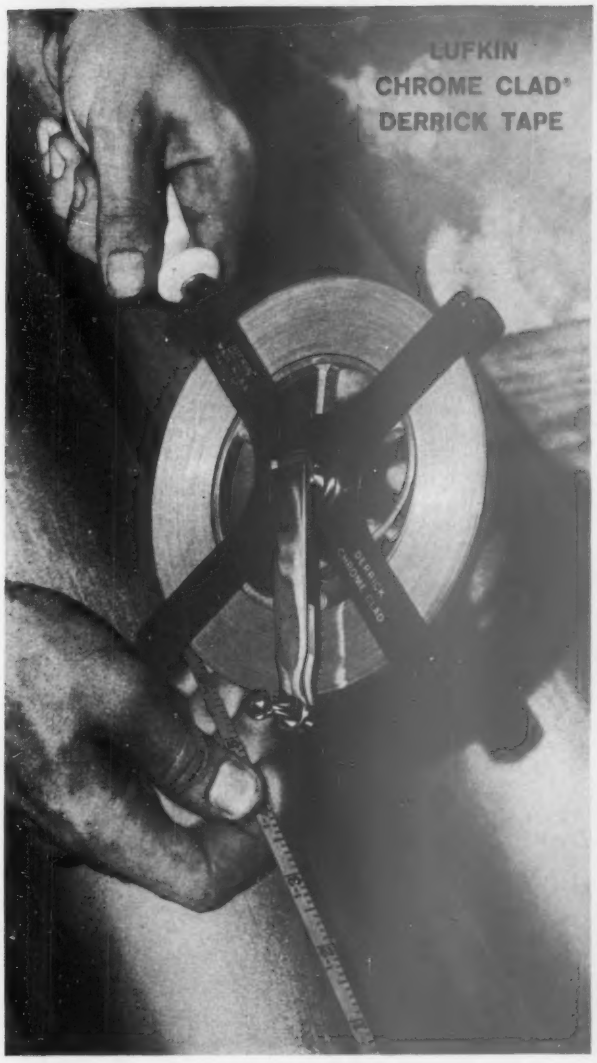
. . . and strategically-placed nozzles spray water over the blaze. It's the fastest fire protection system ever devised!

If you work with solid propellants — or *any* material that demands ultra-high-speed fire control — Grinnell's new Primac system can give you the protection you need. Each Primac system is specifically designed to fit a particular application. Write for information, to Grinnell Company, Inc., Providence 1, R. I.

*Patent Pending

GRINNELL

AUTOMATIC SPRINKLER FIRE PROTECTION SINCE 1878



Exclusive LUFKIN Chrome Clad® lines defy grit, grease, gravel—and rugged use!

Here are "he-man tapes" that work like troopers when the job's toughest!

Easy-to-read markings will *stay* easy to read, because they're bonded to steel, electroplated and chrome coated. Lines won't kink or break. Sturdy metal construction (except for carrying handle). It all adds up to two-fisted quality that *lasts!*

Exclusive quality features are yours in *all* Lufkin tapes. For example:

Lufkin Chrome Clad® DERRICK Tape (above, left) gives you instant readings on a line that won't rust, chip or peel. An extra-sturdy line, ¼" wide, with hook and ring. Lock-handle frame. Turn handle over, lock line at any point. Available in 100-200′ lengths.

Lufkin "ATLAS" Gaging Tape (above, right) gives you easier reading, too, with durable, jet-black markings on glare-free line. Line is 50% heavier than standard. Has 20-ounce plumb bob, and sturdy lock-handle frame.

See your Oil Supply House.

Measure for measure, the finest made...

LUFKIN

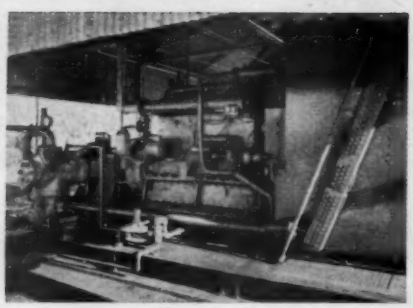
SAGINAW, MICHIGAN

on LAND or on the SEA

WAUKESHA

power for:

DRILLING • COMPRESSORS
WATER FLOOD • PIPE LINES
PUMPING • ELECTRIC POWER



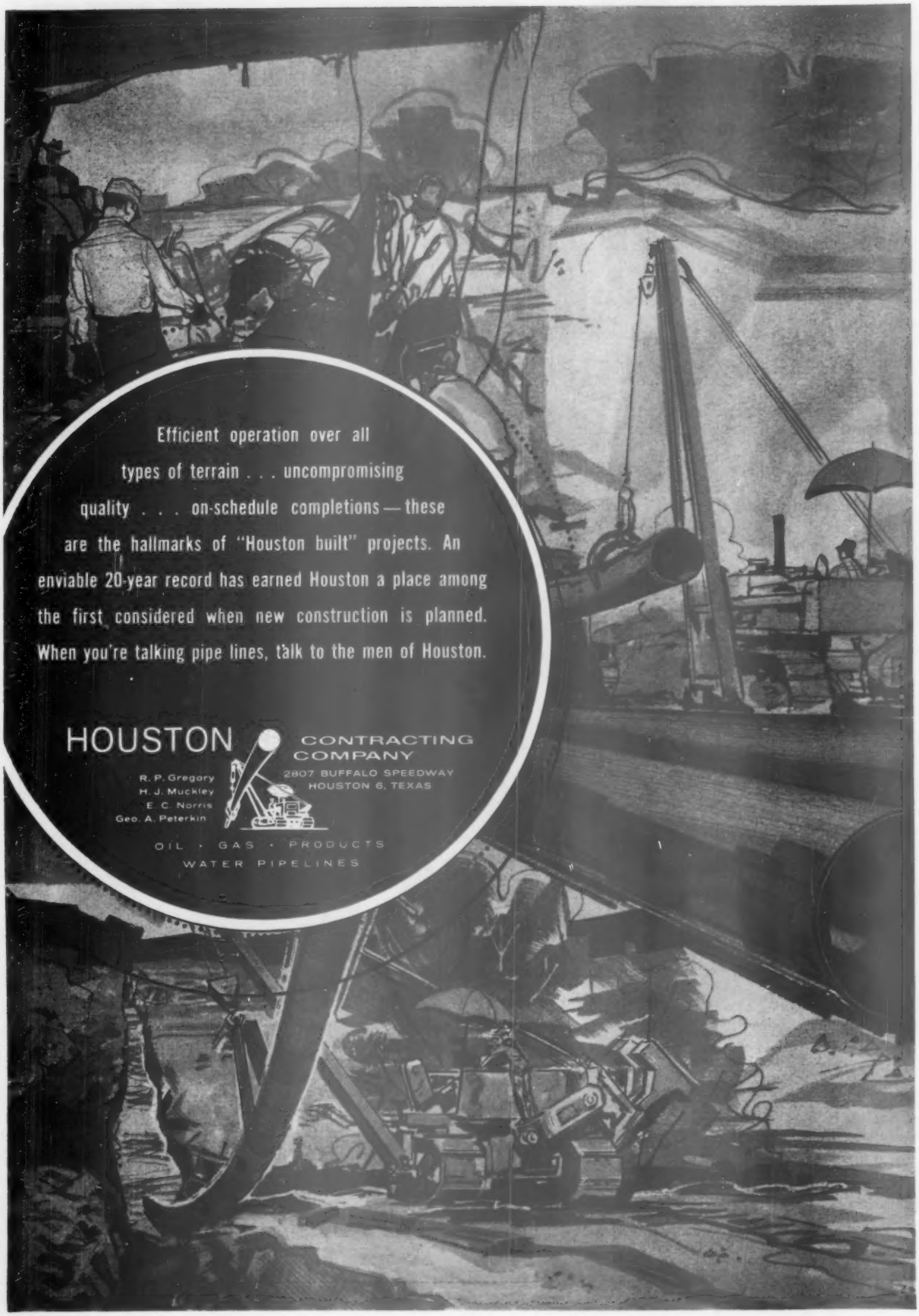
WORLD'S FINEST OIL FIELD POWER

10 to 1235 hp

BOTH DIESELS AND "BUILT-FOR-GAS" ENGINES

520

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN / **New York • Tulsa • Huntington Park, Calif.**
Factories: Waukesha, Wis.; Clinton, Iowa; Houston, Texas


Efficient operation over all types of terrain . . . uncompromising quality . . . on-schedule completions — these are the hallmarks of "Houston built" projects. An enviable 20-year record has earned Houston a place among the first considered when new construction is planned. When you're talking pipe lines, talk to the men of Houston.
HOUSTON
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R. P. Gregory
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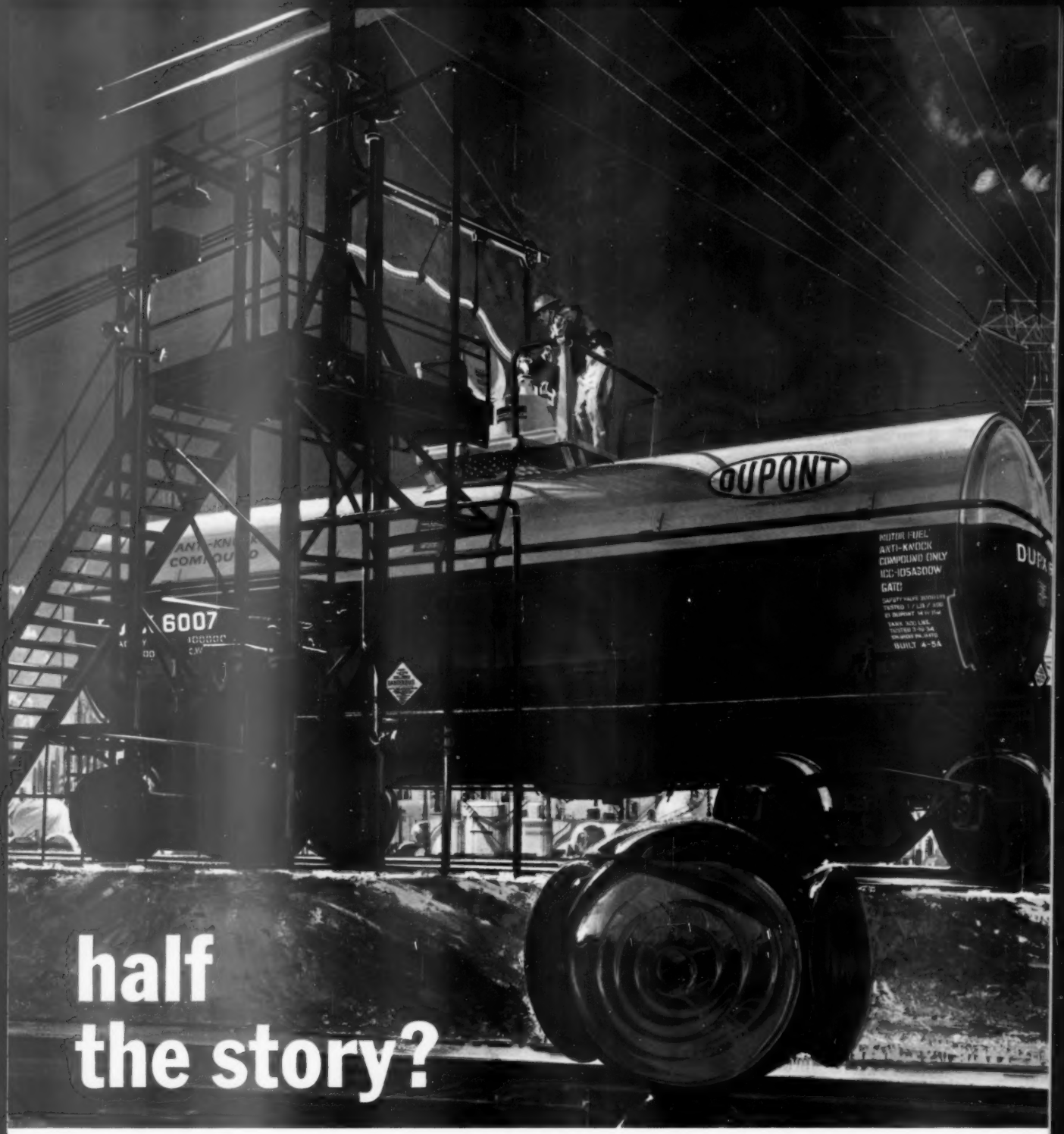
OIL • GAS • PRODUCTS
WATER PIPELINES



half the story?

This familiar tank car tells only half the Du Pont antiknock story. Services are the other half: the "Profile of the Motorist" study, the travel development movies "Down the Road" and "Highway Holiday," as well as dealer surveys and personnel training aids. They are some of the practical advantages of doing business with Du Pont.

E. I. du Pont de Nemours & Co. (Inc.), Petroleum Chemicals Division, Wilmington 98, Delaware.

LEAD ANTIKNOCK COMPOUNDS and other PETROLEUM ADDITIVES

DU PONT
REG. U.S. PAT. OFF.

Better Things for Better Living ... through Chemistry

THE
NEW
AMERICAN

RECREATION EXPLOSION

When the new American isn't hard at work, he's busy having fun.

He's off to skin dive or play golf or water ski—or to do any of a thousand-one other things. He likes his leisure lively.

He doesn't care how far he has to go to find his favorite recreation. His car takes care of that. He just packs up his family and gear—and goes.

At the American Oil Company, we're known for petroleum products and service that help put more pleasure in his going. Our company was formed from three great regional petroleum companies who know what motorists in their areas need and want.

And we are always looking for new ways to improve our products and service. The output of our refineries is precisely planned by electronic computers. They help us tailor the gasoline to fit exactly the climate and altitude of every part of the country. These computers make the right decisions with a speed and accuracy totally impractical by any other known method.

You expect more from American—and you get it!

AMERICAN OIL COMPANY

AMERICAN

another

TRETOLITE SERVICE report

How TRETOLITE RESEARCH *has paid off ...in more-salable oil at lower treating cost*

It was intensive research that led to the founding of the Tretolite Company in the first place. And a program of continuous research has been at the very core of Tretolite operations ever since . . . and has resulted in the development of the very best and most efficient treating chemicals available anywhere.

THE CASE FOR TRET-O-LITE DEMULSIFIERS

To see what Tretolite research has meant to the producer, let's look at a few then-and-now facts concerning TRET-O-LITE* Chemical Demulsifiers:

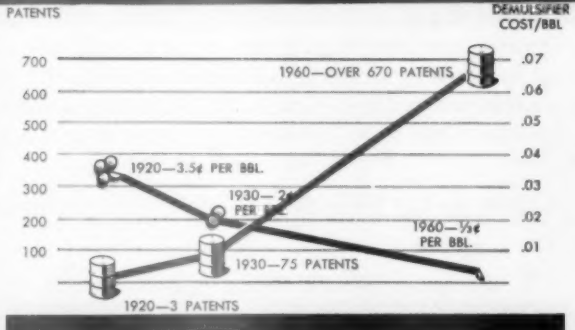
Needless Waste Stopped. Prior to the Tretolite discovery, literally millions of barrels of emulsified crude were thrown away—unusable, unrefinable.

Effectiveness Improved. In the beginning, one drum of demulsifying chemical was needed to recover about 2200 barrels of pipeline oil. Today, one drum will recover nearly 40,000 barrels.

BS&W Specs Reduced. Until 1930, "pipeline specification" for crude was about 3% BS&W. Today, the acceptable maximum is less than 1%—a trend due in large part to the constant improvement of modern demulsifiers.

Drastic Cut In Treatment Costs. In the 1920's, demulsification costs were around 2 to 3.5 *cents* per barrel. Today, in most areas, they are around 2 to 3 *mills* per barrel.

OVER 670 REASONS WHY *IT COSTS YOU* **LESS** *TO GET* **MORE** *SALABLE OIL TODAY!*



Tretolite had just 3 demulsification patents in 1920. By 1930, the number had increased to 75. Today, the Petrolite Corporation, of which Tretolite is a division, holds nearly 700 demulsification patents—nearly 700 reasons why it costs you less than ever before in oil history to treat oil, and provides you with a better, more salable product.

PETROLITE CORPORATION

SUBSIDIARY AND AFFILIATED COMPANIES

CANADA, Edmonton, Alberta • ENGLAND, London
GERMANY, Frankfurt, a. M. • VENEZUELA, Caracas

TRETOLITE COMPANY
DIVISIONS

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GUIBERSON

DRILLABLE BRIDGE PLUGS.. *leave no steel in well when set..short.. easy and fast to drill out*

TYPE B
(Cast Iron)

TYPE WE
(Cast Iron)

Here's where they cut your completion costs..

FOR PERMANENT INSTALLATIONS

Bridge plugs of cast iron.

FOR TEMPORARY INSTALLATIONS

Bridge plugs of magnesium, covered with a plastic coating to resist corrosion.

WHERE HIGH PRESSURE IS BELOW PLUG

Types WE & WME bridge plugs have bridge in upper end. Bridge can be drilled out without disturbing upper slips, so plug remains set while pressures equalize and drilling resumes in complete safety. These plugs are wire line set.

CONVERTIBLE TO DRILLABLE CEMENT RETAINERS

Types B & BM have bridge in lower end which can be replaced by an inexpensive, effective check valve to convert plugs into cement retainers. Drillable drop balls are available to seal in mandrel when pressure work must be done above retainer.

All parts of Guiberson bridge plugs are rigidly held in position. Shock and impact loads are transmitted directly to the mandrel while running in .. reducing the danger of premature setting. Slips are of special heat-treated cast iron. High grade special packing element is designed to handle the extreme pressures and temperatures found in deep wells. Bridge plugs and cement retainers can be set by wire line, tubing or drill pipe.

Sold by Oil Field Supply Stores Everywhere

Better be Safe than Sorry — go Guiberson

Both plugs are also made in magnesium and are then designated as Type BM and Type WME

THE GUIBERSON CORPORATION
DALLAS, TEXAS. U. S. A.

SAFE THAN SORRY BETTER BE GUIBERSON R

DRESSER INDUSTRIES INC.

PRODUCTION, DRILLING AND WORKOVER SPECIALTIES, MOLDED RUBBER PRODUCTS

OIL • GAS • ELECTRONICS CHEMICAL • INDUSTRIAL

SILICONE NEWS from Dow Corning

Found: a paint that lasts

Silicone-based paints last longer; reduce maintenance time and costs

These two pictures emphasize the stubborn fight that maintenance coatings based on Dow Corning silicone resins put up against severe weathering conditions. Located in a northern industrial city, this water tower is constantly exposed to an army of paint killers — summer sun, winter sleet, smoke, rain, *plus* a corrosive chemical laden atmosphere.

At left, the tower is shown two years after it was painted with a conventional organic coating that withstood severe weathering during this period. Rust and corrosion marred its appearance and promised even greater damage. Using organic paints it was necessary to paint the tower at least every two years, a costly, almost continuous job.

Now, see how a silicone-based paint has cut this maintenance process in half. At the right, the tower is coated with an aluminum pigmented silicone-alkyd. But this paint job was done two years ago! The tower is still gleaming bright and completely protected. And maintenance men predict it will stay that way for several years more. The savings in time and money are obvious.

Beat high heat! Such a silicone-based coating can also be readily applied to surfaces that run hot, such as encountered on industrial stacks, mufflers, furnaces. Blistering, peeling, rust and corrosion are prevented; need for costly repainting and — in many cases — expensive replacement is greatly reduced.

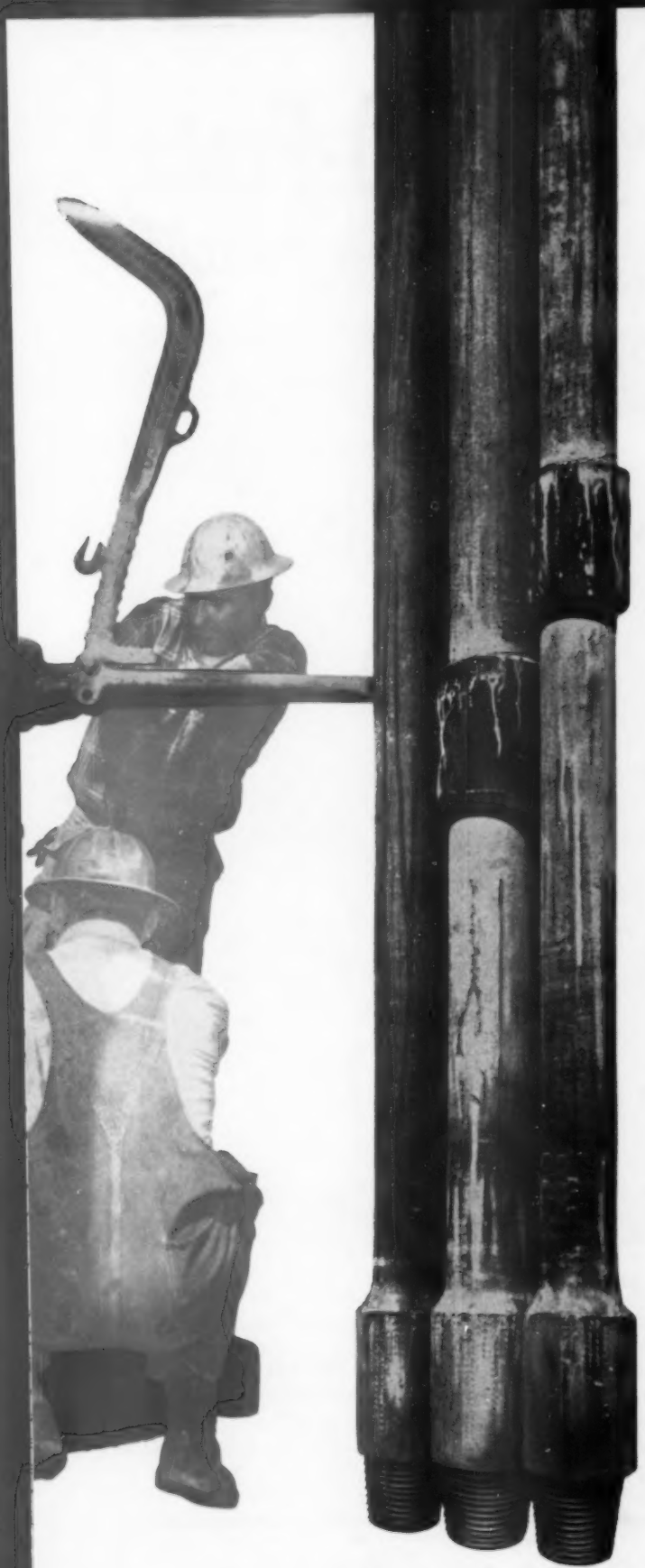
Lasting colors, too. Silicone-based paints are now available in many colors . . . colors that stay put and don't fade. This means you can carry your color-coding* on hot equipment for greater safety and efficiency while improving the overall beauty of your plant.

When you can have coatings like this — that last from 25% to 50% longer; that make plants and equipment look better, longer — don't you think you should find out more about them soon?

Send for your copy of "Why Silicone-Based Paints Mean Less Maintenance." Write Dow Corning Corporation, Department 8822a, Midland, Mich.

first in silicones

Dow Corning

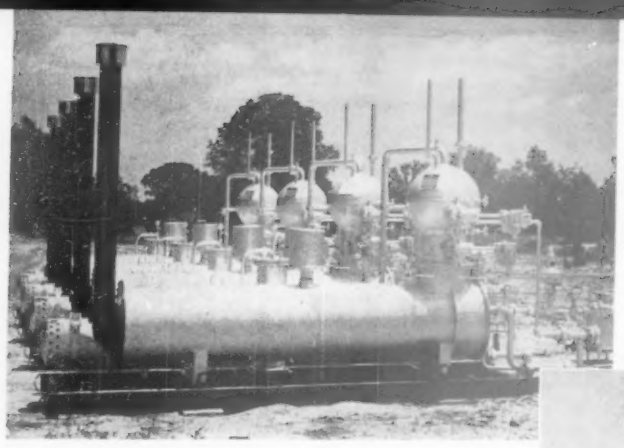


SUCCESSFUL COMING OUT PARTY!

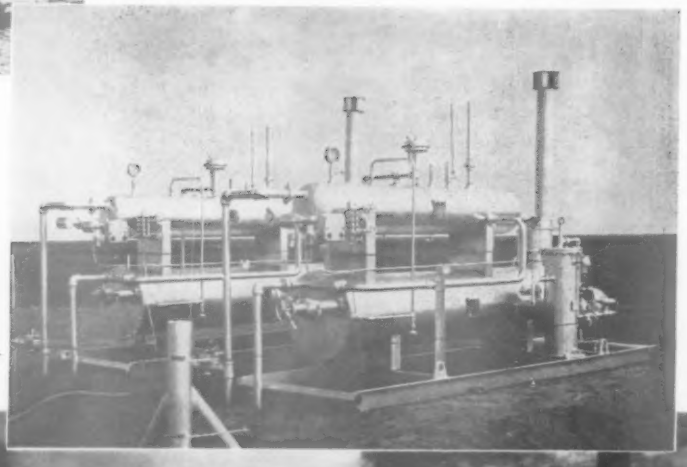
It's successful because it goes strictly according to plan. Up comes over 8000 feet of J&L Seamless Drill Pipe to make a perfect trip. What happened here—what the picture shows—is normal, routine, planned, and always important. A professional crew **expects** a trouble-free trip . . . **expects** drill pipe to come out of the hole in good shape. Ask around. J&L Drill Pipe has a reputation for meeting your best expectations. The reputation has been earned the hard way—in action—on countless drilling jobs. J&L Casing and Tubing have the same top reputation for quality. Reason: J&L has invested millions in the best tubular production and testing equipment known. Talk performance and value with your J&L salesman soon.

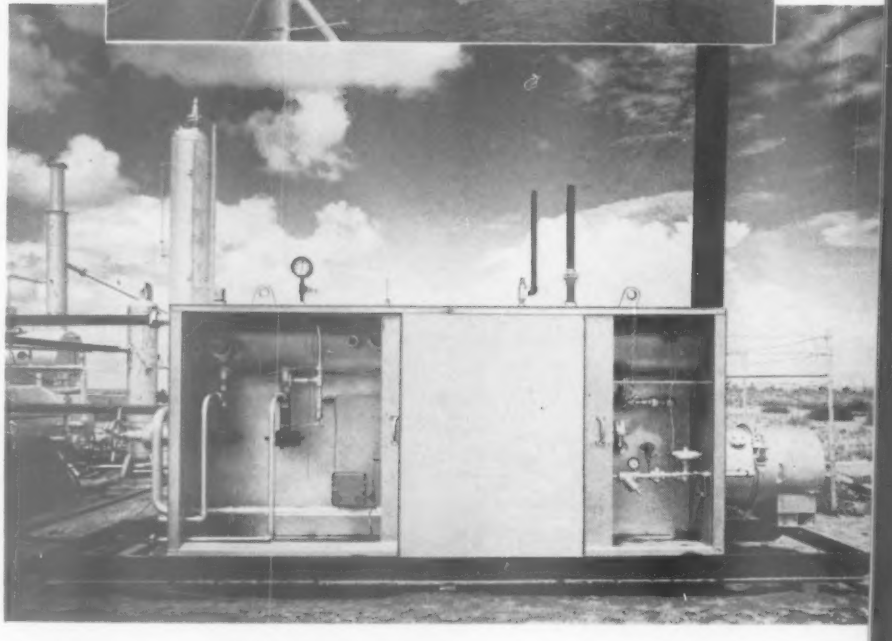
Jones & Laughlin Steel Corporation
3 Gateway Center, Pittsburgh 30, Penna.

STEEL



Free-O-Freez
PUTS ON AN OVERCOAT





Efficient, trouble-free production in all types of weather. This is what every operator wants from his wellhead production equipment.

A few years ago BS&B went a long way toward achieving this by introducing FREE-O-FREEZ . . . a line of compact, automatic skid-mounted production units that featured immersion of the water-oil section of the separator in a hot water bath and location of controls as close as possible to the heat source.

These units have proved themselves under severe weather conditions in the Panhandle, Permian Basin, and Four Corners area.

But there are still instances where production units need to be fully protected because of extreme cold, high moisture, or blowing dust that tend to foul up controls and valving.

So now you can get FREE-O-FREEZ with an "overcoat" . . . with all the time-tested features of other FREE-O-FREEZ equipment, of course.

Ask your BS&B Salesman about FREE-O-FREEZ, or write to Black, Sivalls & Bryson, Dept. 1-A10, Box 1714, Oklahoma City, Oklahoma.

DESIGN FEATURES

- *Controls, piping, and valves completely housed, protected against cold, dust and moisture.*
- *Skid-mounted, completely piped for immediate field hook-up.*
- *Removable firebox located at opposite end from tube bundle.*
- *Tube bundle easily removed for service.*
- *Heater capacities: 250,000 BTU/hr. and higher.*
- *Available with 2 or 3 phase separators.*

BS&B

BLACK, SIVALLS & BRYSON

OKLAHOMA CITY • KANSAS CITY • TULSA • EDMONTON • THE HAGUE

Mobil Research Announces...

GASOLINE
Realistically Rated
To Meet A Motor's Long-Run Needs!

The Megatane System of Rating Gasoline

A Great New Advancement in Gasoline Technology Introduced With
THE MOST POWERFUL TV ADVERTISING CAMPAIGN
In Gasoline History!

What Is The Megatane System of Rating Gasoline? It's the most modern criterion of total gasoline performance. Based on a 5-year study of gasoline performance characteristics, it overcomes the inadequacy of partial ratings (such as octane) and provides an inclusive rating of gasoline performance.

What Does It Do? It rates all essential qualities and features in a gasoline. And, measures the optimum balance required to deliver what a car owner needs most —namely, *total performance!*

How Does It Differ From Other Measuring Sticks? The principle of Megatane Rating can be understood very simply by comparing it with Octane Rating. Determined by laboratory and road-test methods, Octane Rating measures gasoline's anti-knock performance. However, the new Megatane Rating System measures not only Octane Rating, but *all the qualities and features needed for the ideal gasoline!*

How Many Rating Points Are There? The Megatane Rating System embraces the 21 qualities Mobil engineers believe should be found in the ideal gasoline—including high volatility, high energy, weather-conditioned blends, etc.

How Do Mobil Gasolines Rate? The ideal Megatane rating of 21 has not yet been achieved by anyone . . . not even Mobil. However, new Mobil Premium rates higher on the Megatane scale (19 out of 21) than any leading Premium. And—new Mobil Regular, with 16 out of 21, rates higher than any leading Regular gasoline!

How Will These New Mobil Gasolines Be Introduced? With the most powerful TV ADVERTISING CAMPAIGN in gasoline history—backed by widespread full-page newspaper advertising! Starting Sept. 25th, the air-waves will be literally saturated with Mobil advertising featuring the new Megatane Rating System. Using the staggering total of 21 TV NETWORK SHOWS throughout 1961—running the gamut from Westerns, Dramas, Comedies to Sports and News shows—in prime evening viewing hours . . . every day in the week . . . car owners will be directed to their nearest Mobil Dealer for details.

Mobil

MOBIL OIL COMPANY

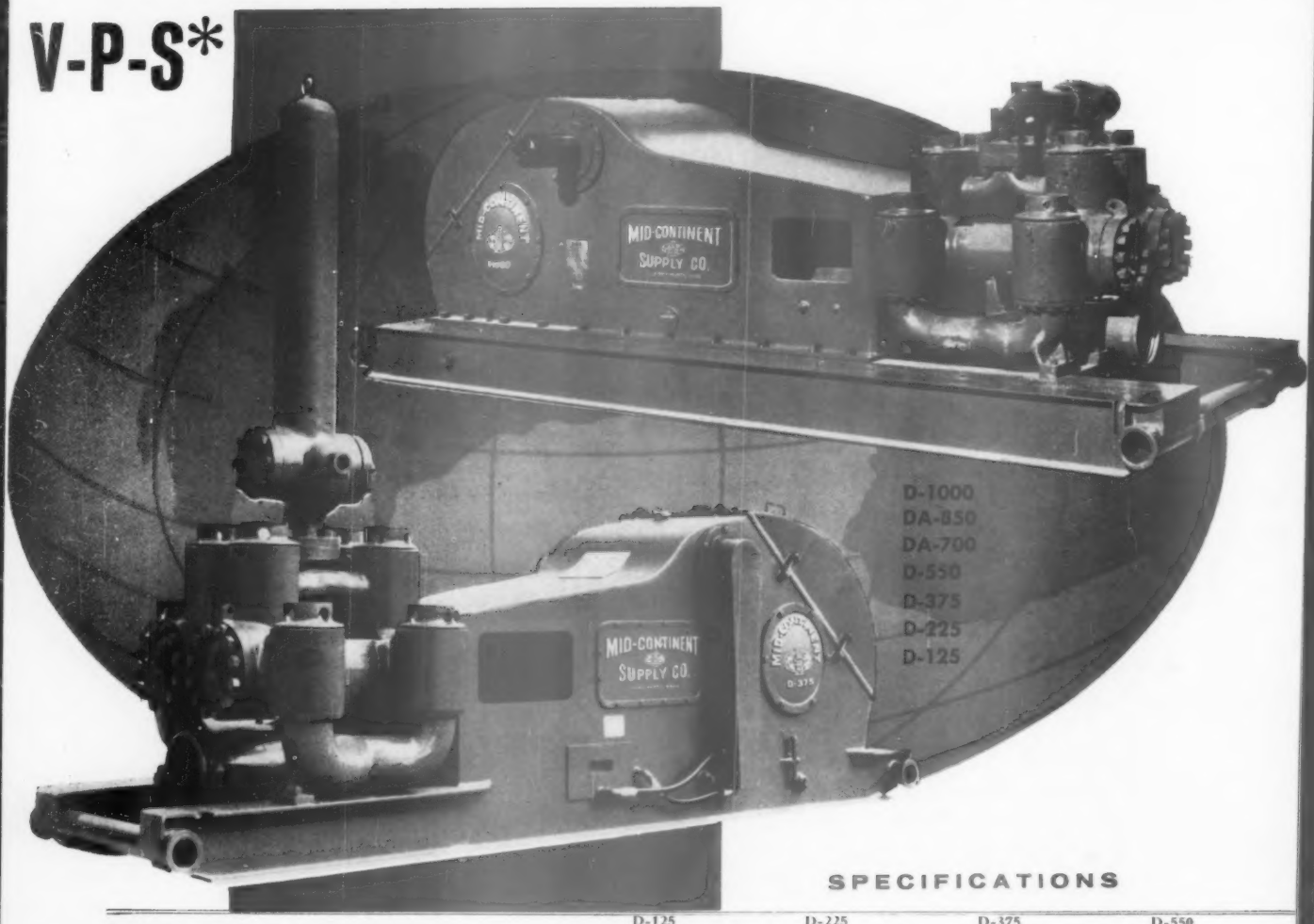
A Division of Socony Mobil Oil Company, Inc.

FOR DRILLING OPERATIONS ANYWHERE IN THE WORLD THERE IS A

Mid-Continent Emsco Slush Pump

...Seven Slush Pumps to match

V-P-S*



SPECIFICATIONS

	D-125	D-225	D-375	D-550
Maximum Liner Size by Stroke	7¼" x 10"	7¼" x 12"	7½" x 14"	7½" x 16"
Piston Rod—Diameter and Taper	1¾"—3 API	1⅞"—4 API	2"—4 API	2½"—5 API
Fluid End Test Pressure	3500 psi	3500 psi	4000 psi	6000 psi
Suction Manifold	8" Female	8" Female	10" Male	10" Male
Discharge Manifold	3" Female	3" Female	4" Female	4" Female
Gear Ratio	4.96:1	5.43:1	5.04:1	5.04:1
Gear Face	5"	9"	11¼"	13"
Pinion Shaft Extension (Clear)	9½"	9⅞"	12⅛"	15½"
Bearing	Roller	Roller	Roller	Roller
Keyway	1" x ½"	1" x ½"	1¼" x ⅝"	1½" x ¾"
Eccentric Drive Bearings	Roller	Roller	Roller	Roller
Main Shaft Bearings	Self Align	Self Align	Self Align	Self Align
Crosshead Bearings	Double Needle Roller	Double Needle Roller	Double Needle Roller	Double Needle Roller
Length—Overall	11'—2"	12'—6"	14'—8"	16'—8"
Width				
Overall—Inc. Shaft Ext.	4'—½"	4'—1⅝"	4'—8"	6'—8¼"
Fluid End	3'—8½"	3'—8½"	4'—1"	4'—6½"
Power End—Inc. Shaft Ext.	4'—1½"	4'—5⅛"	4'—4 11/16"	6'—5"
Skid	3'—3¾"	3'—7⅝"	3'—6¾"	6'
Height—Less Air Chamber	3'—9"	4'—1⅛"	4'—9"	5'—4½"
Approximate Weight	8,700 lbs.	13,000 lbs.	18,300 lbs.	29,000 lbs.

SPECIFY MID-CONTINENT FOR

VALUE-PLUS-SERVICE*

IN DRILLING MACHINERY

DESIGNED FOR THE JOB.

your exact power, pressure and volume requirements

Pioneered by Mid-Continent Supply Co. since 1938 throughout the oil fields of the world, this line of all steel, roller bearing pumps assures fastest penetration under all types of drilling conditions. A complete range of sizes to cover minimum and maximum conditions enables the user to select a pump to meet the exact job . . . expertly designed for light-weight, easy maintenance, durability and dependability. And Mid-Continent backs these pumps with fast, dependable field service from strategically located parts and service centers.

For assistance in selecting a Mid-Continent Emsco pump for your exact requirements, contact your nearest Mid-Continent representative.

MID-CONTINENT PUMP PARTS AND SERVICE CENTERS ARE STRATEGICALLY LOCATED IN THE ACTIVE OIL AREAS.

DA-700	DA-850	D-1000
8¼" x 16"	8¼" x 18"	8¼" x 18"
2¾"—6 API	3"—6 API	3"—6 API
6000 psi	6000 psi	6000 psi
10" Male	12" Male	12" Male
4" Female	4" Female	4" Female
5.05:1	5.03:1	4.76:1
14"	16"	18"
14"	15"	15"
Roller	Roller	Roller
1½" x ¾"	1½" x ¾"	1½" x ¾"
Roller	Roller	Roller
Self Align	Self Align	Self Align
Double Needle Roller	Double Needle Roller	Double Needle Roller
18'—4⅞"	20'—2"	20'—2"
7'	8'	8'
4'—8½"	6'—6"	6'—6"
6'—7½"	6'—4¼"	6'—4¼"
7'	8'	8'
6'	6'—4½"	6'—6"
37,500 lbs.	48,800 lbs.	50,500 lbs.

PERFORMANCE DATA

	Strokes Per Min.	Max. B.H.P. Input	Operating Data	LINER SIZE										
D-1000				8¼"	8"	7¾"	7½"	7¼"	7"	6¾"	6½"	6¼"	6"	5¾"
	60	1000	G P M Output	933	874	817	760	705	653	603	553	507	463	419
	50	833	G P M Output	778	728	680	633	588	545	503	461	423	385	349
	40	667	G P M Output	623	582	544	506	470	436	402	369	338	308	279
			Gallons per Revolution	15.56	14.57	13.59	12.66	11.75	10.89	10.05	9.22	8.45	7.71	6.98
			Max. Disch. Pressure	1562	1668	1782	1917	2068	2229	2418	2635	2871	3153	3480
DA-850				8¼"	8"	7¾"	7½"	7¼"	7"	6¾"	6½"	6¼"	6"	5¾"
	60	850	G P M Output	933	874	817	760	705	653	603	553	507	463	419
	50	709	G P M Output	778	728	680	633	588	545	503	461	423	385	349
	40	567	G P M Output	623	582	544	506	470	436	402	369	338	308	279
			Gallons per Revolution	15.56	14.57	13.59	12.66	11.75	10.89	10.05	9.22	8.45	7.71	6.98
			Max. Disch. Pressure	1328	1418	1515	1629	1758	1895	2055	2240	2440	2680	2984
DA-700				8¼"	8"	7¾"	7½"	7¼"	7"	6¾"	6½"	6¼"	6"	5¾"	5½"
	65	700	G P M Output	908	853	796	742	690	640	591	544	499	456	414	374
	55	592	G P M Output	769	721	674	628	584	541	500	460	422	386	350	317
	45	485	G P M Output	630	590	551	514	477	443	409	377	345	316	287	259
			Gallons per Revolution	13.99	13.10	12.25	11.42	10.61	9.84	9.09	8.37	7.66	7.02	6.37	5.76
			Max. Disch. Pressure	1120	1197	1281	1374	1478	1593	1726	1875	2044	2226	2453	2727
D-550				7½"	7¼"	7"	6¾"	6½"	6¼"	6"	5¾"	5½"	5¼"	5"	4¾"
	65	550	G P M Output	751	699	649	600	553	508	464	423	383	346	309	275
	55	465	G P M Output	636	592	549	508	468	430	393	358	325	293	262	233
	45	381	G P M Output	520	484	449	415	383	352	321	292	266	239	214	190
			Gallons per Revolution	11.56	10.76	9.98	9.23	8.51	7.82	7.14	6.51	5.90	5.32	4.76	4.23
			Max. Disch. Pressure	1067	1148	1235	1336	1449	1577	1727	1894	2080	2317	2560	2915
D-375				7½"	7¼"	7"	6¾"	6½"	6¼"	6"	5¾"	5½"	5¼"	5"	4¾"
	70	375	G P M Output	723	674	626	581	536	494	472	414	376	341	307	276
	60	321	G P M Output	620	577	537	498	460	423	405	355	323	292	263	235
	45	241	G P M Output	465	433	403	373	345	318	303	266	242	219	197	176
			Gallons per Revolution	16.328	9.626	8.948	8.294	7.663	7.056	6.743	5.913	5.378	4.867	4.379	3.915
			Max. Disch. Pressure	744	810	871	939	1018	1104	1186	1318	1451	1600	1777	1991
D-225				7¼"	7"	6¾"	6½"	6¼"	6"	5¾"	5½"	5¼"	5"	4¾"	4½"
	70	225	G P M Output	580	539	500	462	426	391	357	325	295	265	237	211
	60	193	G P M Output	497	462	429	396	365	335	306	279	252	227	203	180
	45	145	G P M Output	373	347	321	297	274	251	229	209	189	171	153	136
			Gallons per Revolution	8.283	7.703	7.142	6.602	6.083	5.583	5.104	4.646	4.208	3.790	3.392	3.013
			Max. Disch. Pressure	565	607	654	708	769	836	918	1007	1111	1234	1379	1551
D-125				7¼"	7"	6¾"	6½"	6¼"	6"	5¾"	5½"	5¼"	5"	4¾"	4½"
	85	125	G P M Output	590	557	509	471	434	399	365	332	301	271	243	216
	70	103	G P M Output	486	459	416	388	357	328	300	273	248	223	200	178
	55	81	G P M Output	382	361	329	305	281	258	236	215	195	176	157	140
			Gallons per Revolution	6.940	6.456	5.968	5.538	5.104	4.688	4.288	3.906	3.540	3.192	2.860	2.546
			Max. Disch. Pressure	308	329	357	386	419	456	499	548	604	670	748	840

MID-CONTINENT SUPPLY CO.

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

Mid-Continent Building, Fort Worth, Texas • Export Division: 45 Rockefeller Plaza, New York 20, N.Y. Cable: MIDCUMPORT NYK

SP2-0

THE LOW COST UNION FOR LOW PRESSURE LINES

If you are looking for new economies, here is a way to save money and maintain efficiency on your drilling rigs. Use WECO Air-O-Unions on the mud suction and return lines as well as all other low pressure lines on the rig.

Their initial low cost is just the beginning of your savings. Make-up time is only a matter of minutes. With the Air-O-Union welded in place, plain pipe is inserted and the seal completed with a shot of air. No bolts, nuts or wrenches are required . . . no close line-up is necessary. Seal is not affected by vibration, misalignment or pipe expansion. To break out, just deflate the tube.

Switch to low cost, time-saving, simple WECO Air-O-Unions on all low pressure lines and start economizing with your next rig-up. Air-O-Unions, in sizes 4" through 16", are available from your supply store . . . or ask your WECO or Chiksan representative.

WECO

WELL EQUIPMENT MFG. CORP.
P. O. BOX 19465 • HOUSTON 24, TEXAS
Division of CHIKSAN COMPANY
a subsidiary of FMC CORPORATION

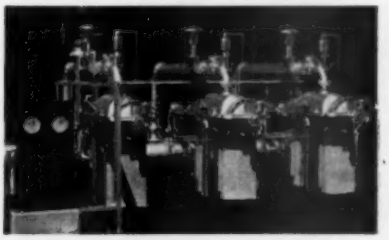
fmc CORPORATION

How an Oklahoma Operator Dried Up Valve Trouble On a Big Waterflood

This is a view of the water injection manifold on the Naval Reserve Field waterflood project in Oklahoma. In the beginning, this operation was plagued with valve troubles . . . until UNIBOLT Adjustable Valves were installed.

As is the case in many waterflood operations, the raw water at Naval Reserve is corrosive and abrasive. Cavitation of the fluid as it passes thru the valve has an eroding effect on the valve seats. However, since the UNIBOLT Adjustable Valve employs both the right design and the right materials, it has practically put an end to this Operator's valve troubles. For example, the stem and seat are of special analysis chrome steel, honed to mirror smoothness. And the stem is guided to the seat thru an extra long pilot that exactly centers it to insure a streamlined flow. Manufacturing details, perhaps, but added to dozens of similar features they add up to perfection and the one valve that is best suited for waterflood injection manifold and similar troublesome services.

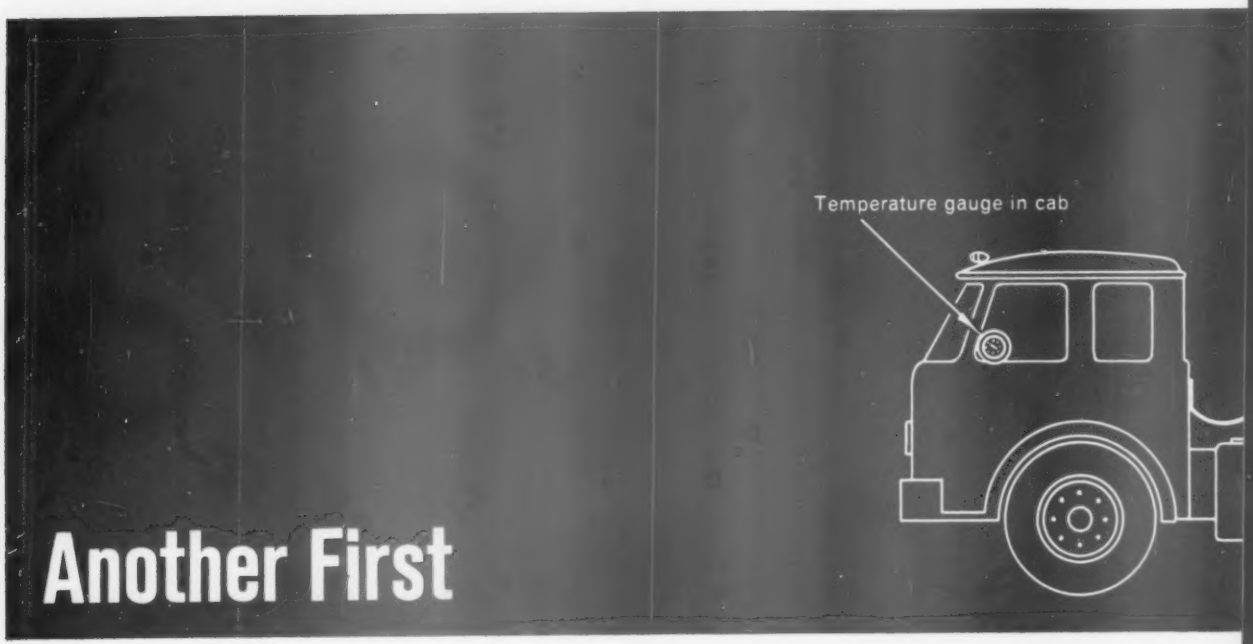
Planning a waterflood or having valve troubles in your present system? Talk to the UNIBOLT representative in your area and get all the facts about this Adjustable Valve.



Three self-cleaning Jet Filters, manufactured by Thornhill-Craver Co., on a waterflood operation near Odessa, Texas. These Filters automatically clean raw injection water to any desired degree, even to sub-micron particle size.

THORNHILL UNIBOLT **CRAVER CO.**

P. O. Box 1184, Houston, Texas

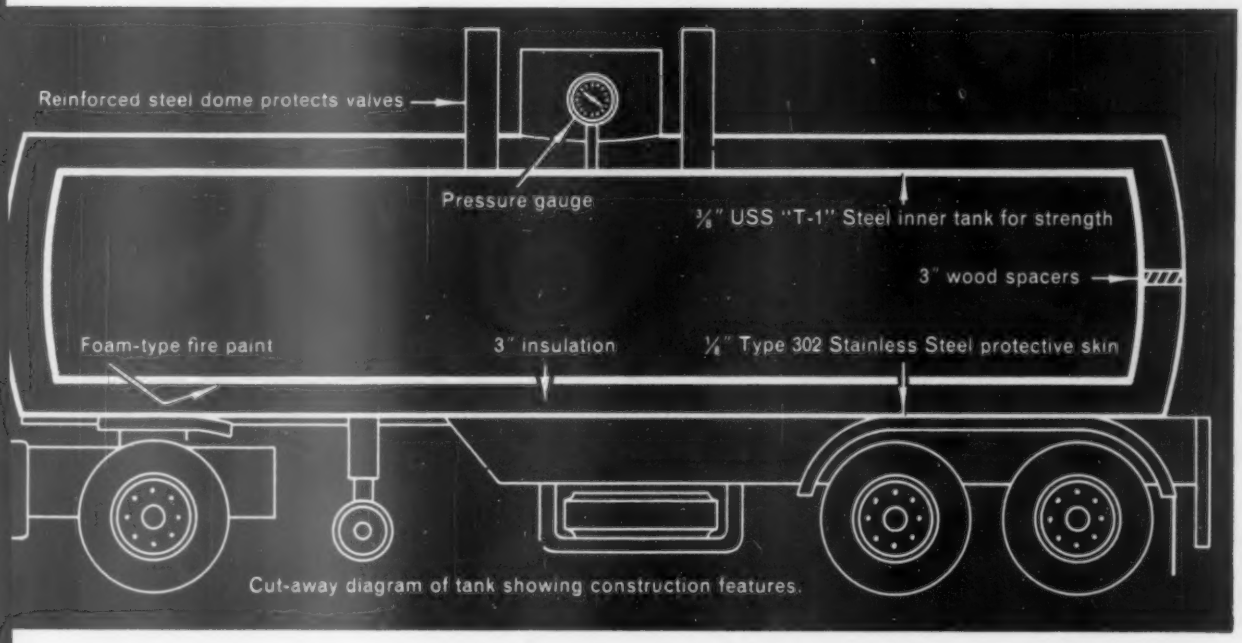


Another First

USS "T-1" Steel—Stainless Steel in a tank truck

Safety check up. Specially trained drivers are used on this truck to deliver ethylene oxide for General Aniline & Film. Before takeoff, a 10-point pre-loading and a 12-point post-loading check is made for safety. The trailer was built by Trinity Steel Company, Inc., 4001 Irving Blvd., Dallas, Texas.

This mark tells you a product is made of modern, dependable Steel.


Reinforced steel dome protects valves
Pressure gauge
⅜" USS "T-1" Steel inner tank for strength
3" wood spacers
Foam-type fire paint
3" insulation
⅛" Type 302 Stainless Steel protective skin
Cut-away diagram of tank showing construction features.

that hauls ethylene oxide safely—at lower cost

Ethylene oxide can now be added to the list of chemicals that can be shipped safely in bulk by truck. This new tank truck was especially designed to do the job . . . it has been in daily service for over a year at the General Aniline & Film Corporation plant, Linden, New Jersey.

The 5,300-gallon tank is basically a huge steel vacuum bottle. USS "T-1" Constructional Alloy Steel was selected for the inside shell because of its high minimum yield strength of 100,000 psi. This permitted a ⅜-inch plate thickness instead of 1 1/16 inch. Inner tank weight was reduced almost 50%. The lighter weight meant increased payload—an important factor due to highway weight restrictions.

The outside tank is ⅛-inch Stainless Steel (Type 302) with a 3-inch layer of glass wool between the tanks. Ethylene oxide is loaded at 40°F and the truck is designed for a maximum temperature rise of 5°F in 24 hours. Liquid ethylene oxide boils at 51.3°F, and the vapors are highly flammable. The shiny stainless steel reflects heat, helps to keep the tank cool, and has high resistance to tearing in case of accident. Trinity Steel worked to code and general safety requirements in designing and building this special product trailer to meet ICC and ASME Specifications.

Lower costs. Before the use of this truck, receivers who did not have access to railroad sidings had to pay a 50% premium for the drums in which the oxide was shipped. The savings more than justify the use of the truck.

Safety "engineered-in." The use of *extra* strong USS "T-1" Steel and a high yield strength Stainless Steel (Type 302) provide a double measure of safety. The basic specifications of the tank truck were worked out by a committee of the Manufacturing Chemists Association assisted by H. H. Tiedemann, Production Manager of Heavy Chemicals, Antara Chemical Division, General Aniline & Film Corporation.

For more information on what USS "T-1" Steel can do for you, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS and "T-1" are registered trademarks.

United States Steel Corporation • American Steel and Wire Division • Columbia-Geneva Steel Division National Tube Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company

USS **United States Steel**

ROCK ISLAND

GLASS REINFORCED EPOXY PIPE AND TUBING

BEST

BECAUSE IT'S

PRE-STRESSED

This significant development (similar to pre-stressing concrete) places the load on the *glass* — rather than the epoxy resin — through pre-stressing thousands of strands of alternate plies of lateral and longitudinal glass roving. Consequently, Rock Island's new glass/reinforced epoxy pipe and tubing is rugged and practical for use in oil fields.

Pre-stressing develops maximum collapse and tensile strength, making the tubing ideal for high-pressure injection wells. Rock Island 2½" high-pressure tubing is built to withstand pressures up to 1,500 p. s. i. Upset ends are fabricated into the tubing during manufacture for maximum strength. Regular chain tongs may be used in making up joints . . . tubing can be handled in doubles . . . and tubing strings can be suspended on slips. Joints are threaded and coupled with standard AST 60° stub threads.

Thousands of feet of this new tubing (in 20-foot lengths of 2½", 3", and 4" I.D.) are proving highly effective under conditions that call for severe corrosion and paraffin control; and under conditions requiring high pulsating pressure. It is proving equally effective in chemical industry uses for handling corrosive fluid and waste water disposal.

Rock Island glass/reinforced epoxy line pipe is performing in mid-continent oil fields to a high degree of satisfaction in salt water disposal and water flood systems as low-pressure pipe

COMPARATIVE SPECIFICATIONS		
2½" Medium Weight Tubing		
	ROCK ISLAND GLASS-EPOXY	OTHER
Wall Thickness	.15	.15
Operating Pressure	520 p.s.i./120°	275 p.s.i./120°
Operating Collapse	330 p.s.i./120°	80 p.s.i./120°
Operating Axial Tensile	6,060 p.s.i./120°	2,000 p.s.i./120°
2½" High Pressure Tubing		
Wall Thickness	.22	.26
Operating Pressure	1,500 p.s.i./120°	650 p.s.i./120°
Operating Collapse	750 p.s.i./120°	500 p.s.i./120°
Operating Axial Tensile	10,000 p.s.i./120°	5,000 p.s.i./120°

in 2", 2½", 3", and 4" I.D. sizes. Dresser-type couplings may be used. Adaptors are available for 8 round E.U.E. and normal pipe thread.

At the present time, Rock Island pipe and tubing is available in 2", 2½", 3", and 4" sizes. On special order, 6", 8", and 10" line pipe (20-foot lengths) will be fabricated to user's specifications. Future production calls for larger sizes to 30" in diameter. Contact us for detailed specifications: Rock Island Oil & Refining Co., Inc., 321 West Douglas Ave., Wichita, Kansas. Phone: WHitehall 3-8981.

ROCK ISLAND

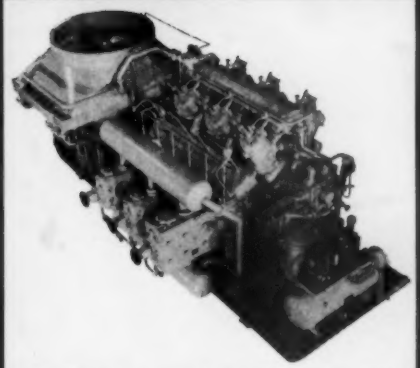
C-B/S Design-Engineered Compressor Plant . . .

Provides Balance and Efficiency For Offshore Gas Boosting, Gas Lift

C-B/Southern designed, engineered and built this 400 horsepower-rated GMXD-6 packaged compressor plant for a Southern Louisiana offshore operation. The problem was to provide a packaged compressor plant with sufficient horsepower rating to handle pressures ranging from 45 psig to 1200 psig, yet so balanced that vibration was negligible since the unit was to be mounted on a submersible 3-tier concrete barge. The natural selection was a C-B/Southern packaged GMXD-6 compressor plant.

The selection was a time-saver, too: while the concrete barge was being constructed in New Orleans the compressor was built in Houston. The compressor and related equipment were installed on the barge in New Orleans, floated to the location. The barge was sunk in place and the compressor connected to the field gas lines.

C-B/Southern and Cooper-Bessemer engineers worked closely with the barge construction people to avoid the possibility of harmful resonant conditions. This is another example of the broad service C-B/Southern offers to provide complete compatibility between the building of packaged compressor plants and operating conditions.



The GMXD-6 was engineered to produce 400 bhp. The GMXD line is also built in horsepower ranges from 265 to 825. C-B/S packaged compressor capability is proved by the 40,000 horsepower the company designed, engineered and built last year. Other packaged compressor plants are available in horsepower ratings from 100 to 1440; unitized compressors, both reciprocating and centrifugal, to 10,500 hp.

CB/S

PACKAGED COMPRESSORS

CB/S

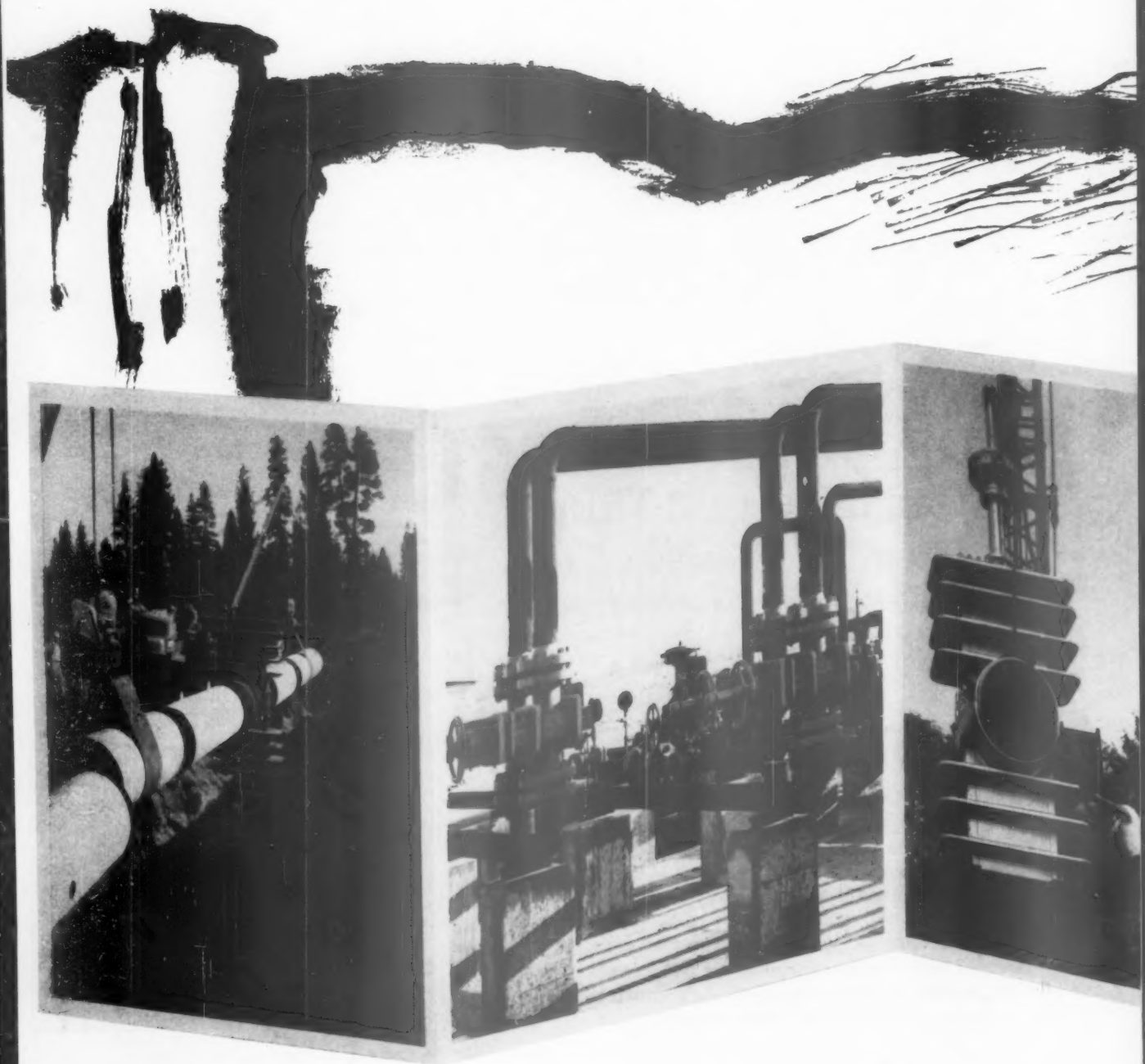
C-B/Southern, P. O. Box 19267, Houston 24, Texas · HOmestead 8-5441

A division of The Cooper-Bessemer Corporation

MANUFACTURERS OF PACKAGED COMPRESSOR PLANTS FOR GAS GATHERING, GAS LIFT, GAS INJECTION APPLICATIONS

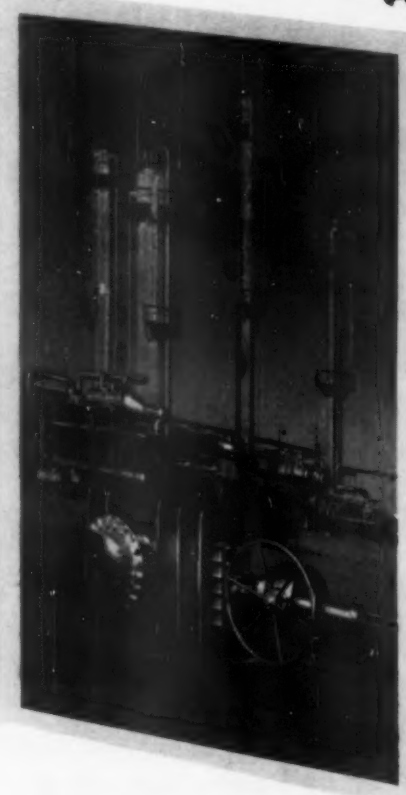
A LIST AS LONG

The "Profit-Minded"



AS YOUR ARM*

companies using proven Grove G-4 Seal-"O"-Ring® Valves



*We'll be glad to send you a copy!

The worth of a valve can often be measured by the companies it serves. And Grove Series G-4 pipeline valves have been performance-proved by hundreds of profit-minded transmission, distribution, crude and product pipeline companies! All over the world, the patented Seal-"O"-Ring design of Grove G-4 valves has been delivering dependable, positive, bubble-tight closing—without the expense and nuisance of periodic lubrication or adding of sealing compounds! Look around for the valves with the "hoop ribs." You'll be impressed with the broad acceptance of Grove Series G-4 gate valves in gas, crude and product service.

GROVE PIPELINE VALVES

GROVE VALVE AND REGULATOR COMPANY

a subsidiary of Walworth

6529 Hollis Street, Oakland 8, California

Offices throughout the U. S. and in Western Canada

FRONTIER CAUSTIC SODA Carries its own umbrella!

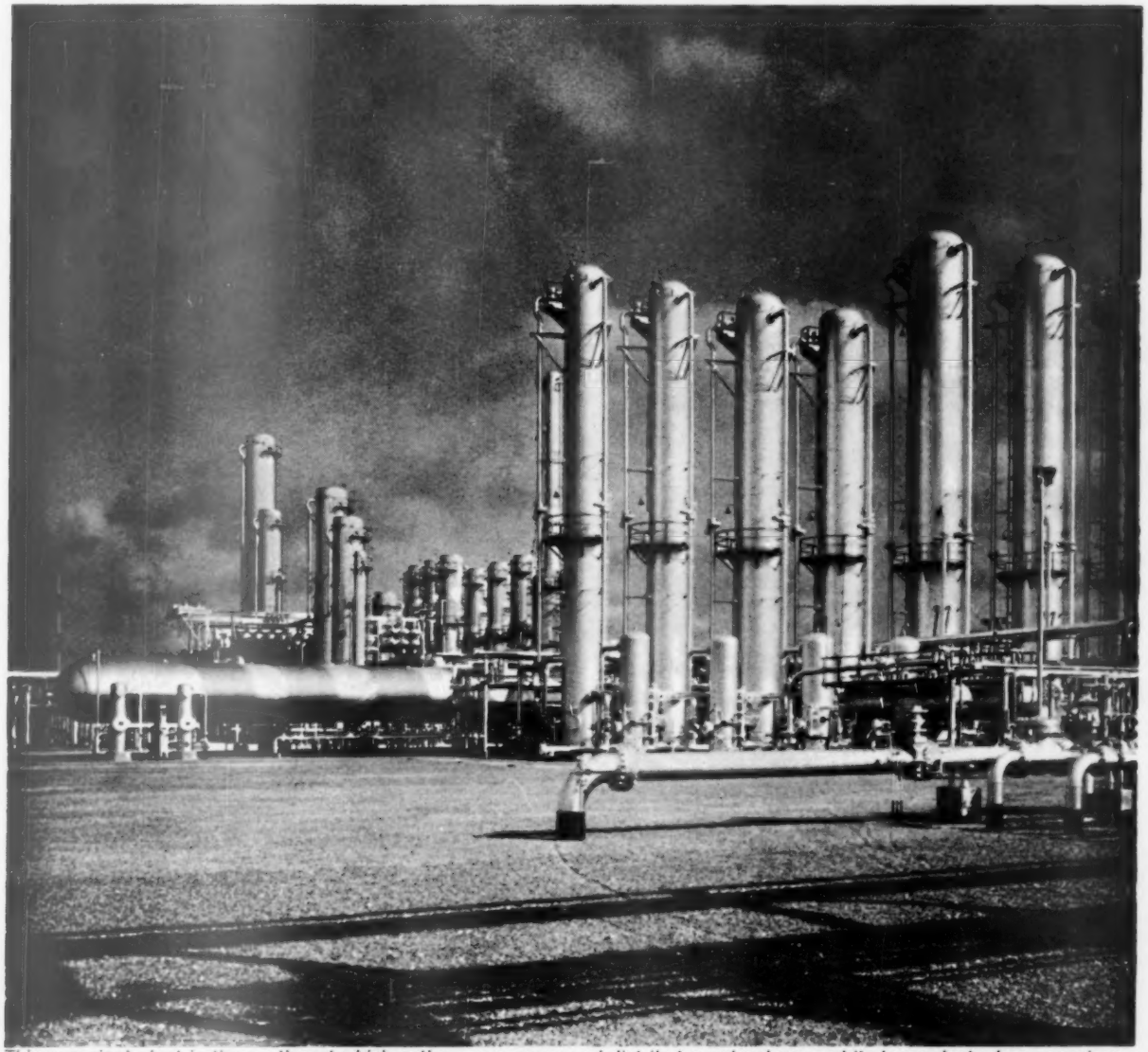
Caught in the rain with no tarpaulin . . . but the load is safe! For FRONTIER Caustic Soda carries its own umbrella. Its exclusive service-proved 50 and 100-lb. bags are heavily coated with moisture-proof polyethylene, sewn and heat-sealed top and bottom. Inside, a waterproof plastic insert features a valve-type "breather" seal that prevents entrance of moist air . . . keeps the caustic from caking. Not one failure has been reported from this new improved bag in oilfield use — many exposed to rain and snow all winter. Specify Frontier Caustic Soda . . . in the weatherproof bag. Frontier Chemical Company, P. O. Box 545, Wichita 1, Kansas.

FRONTIER CHEMICAL COMPANY

division
VULCAN MATERIALS COMPANY

Westinghouse reports on:

Nation's newest and largest Gas Cycling Plant



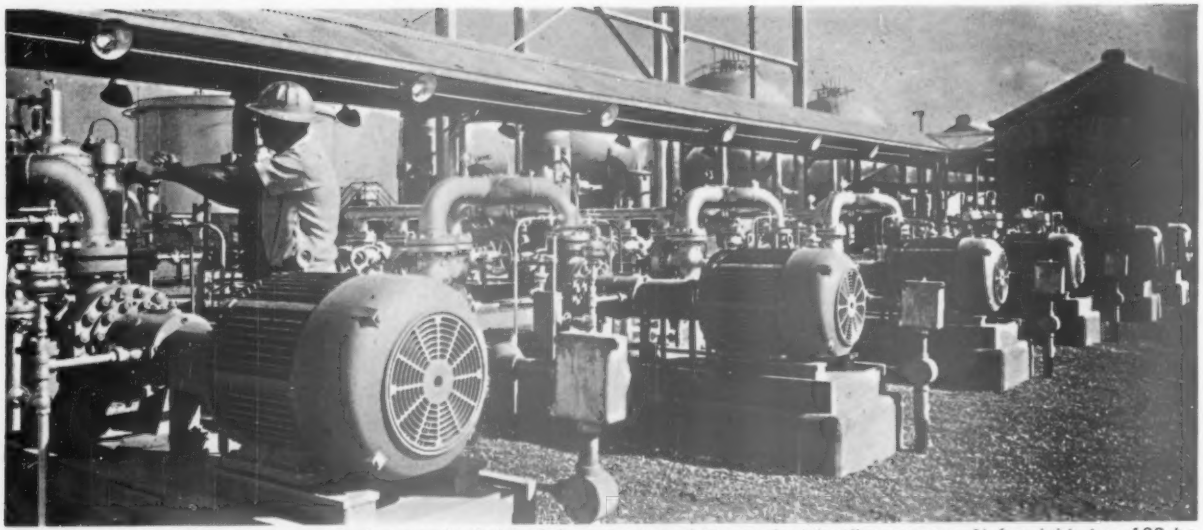
This new giant plant in the southwest which gathers, processes and distributes natural gas and its by-products, has a maximum rated capacity of 950 million cubic feet per day. All electric drives and distribution equipment at the 151 acre plant site were provided by Westinghouse.

J 96176 1

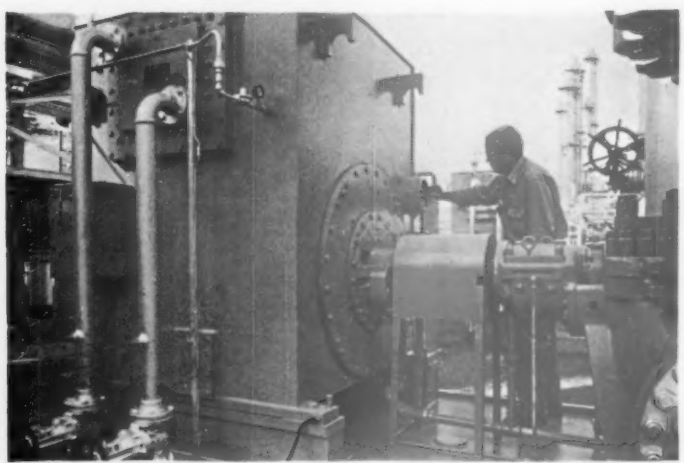
MORE (see next page)

Westinghouse reports on:

Nation's newest and largest Gas Cycling Plant

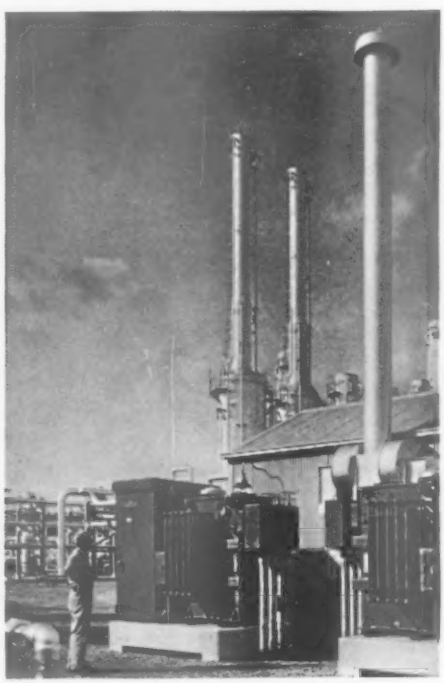


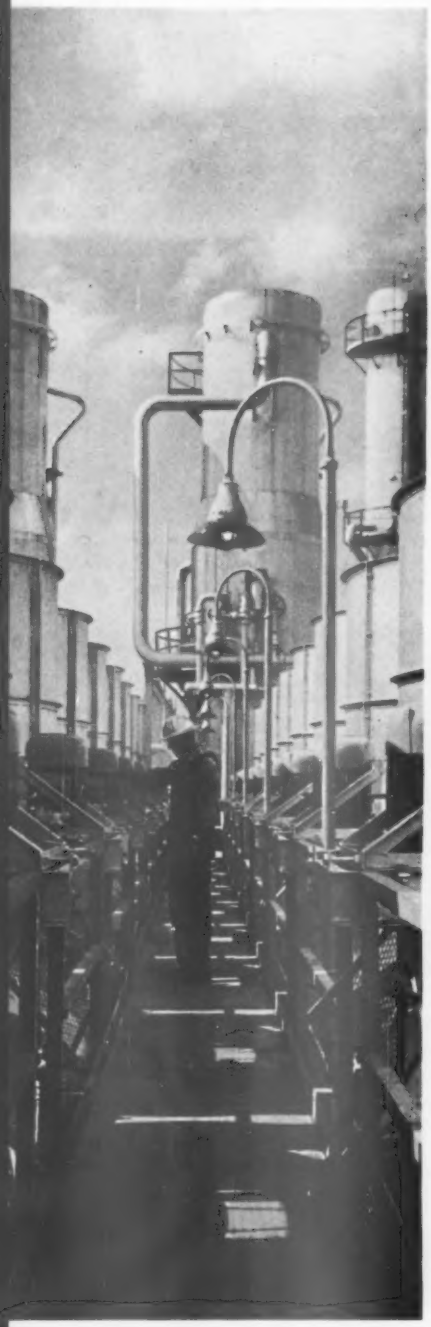
These four 75 hp Westinghouse explosion proof Life-Line® A a-c motors drive product loading pumps. At far right, two 100 hp **Westinghouse a-c motors power gasoline** shipping pumps.



Shown here is a 1500 hp Westinghouse induction generator used in the **plant's main processing area. The generator is in fact a 1500 hp 1800 rpm squirrel cage motor driven above synchronous speed by an oil line pump. Pump runs in reverse to drive motor as generator.**

Pictured (right) is one of the six Westinghouse Load centers serving this large gas recycling plant. Two 1000 kva Westinghouse transformers (in foreground) supply power to injection pumps, de-ethanizer feed pumps, cooling fans and process pumps in the main processing area. J-96176-2





Pumps furnishing cooling water for product and oil coolers are powered by four vertical 200 hp explosion proof Westinghouse Life-Line® A a-c motors.

View of one of the six Westinghouse load centers employed at the plant. Panelboard includes individual controls for pumps, fans and air compressors as well as the lighting system in the compressor area.

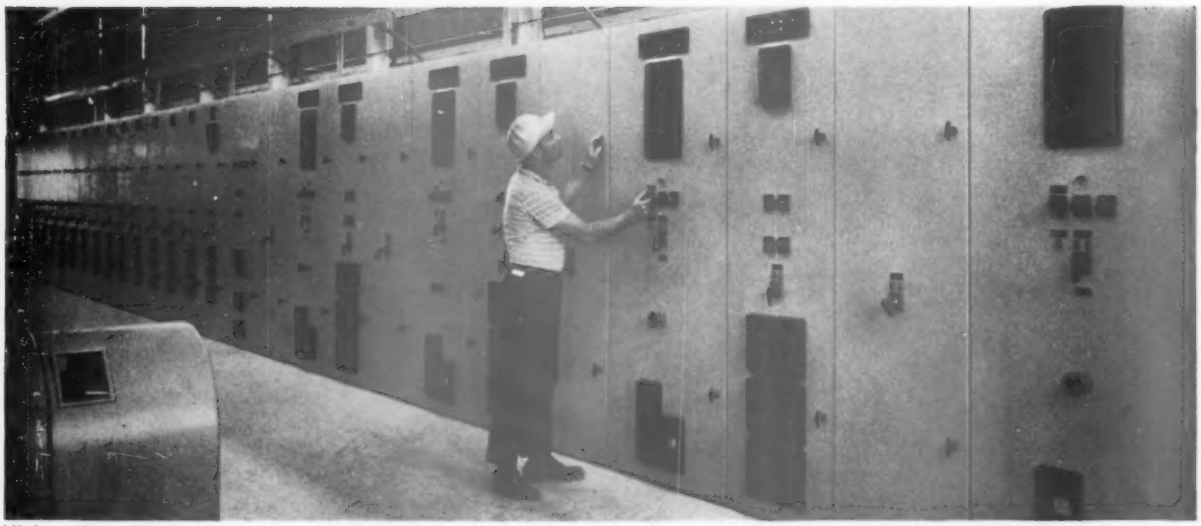
Twenty-two large low pressure "still" condenser fans serving the main processing plant area are individually driven by 10 hp Westinghouse Life-Line® A a-c motors.

J-96176-3

MORE (see next page)

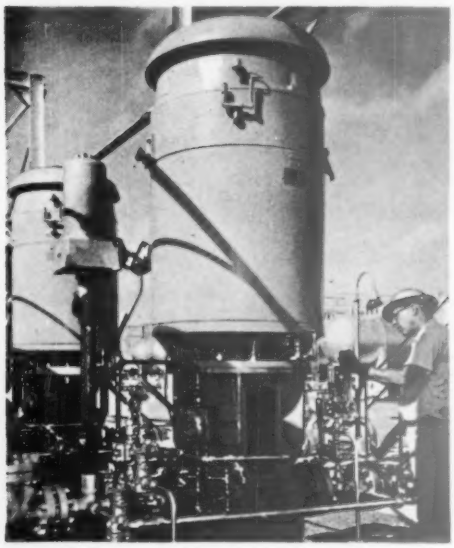
Westinghouse reports on:

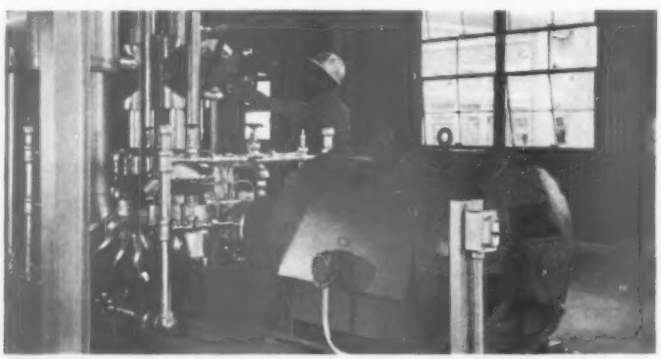
Nation's newest and largest Gas Cycling Plant



High voltage Westinghouse switchgear controls power distribution from four steam-driven turbo-generators to the six load centers at this new giant 151 acre plant in the southwest which has a maximum rated capacity of 950 million cubic feet per day.

Two of three 200 hp Westinghouse explosion proof, fan-cooled motors drive vertical pumps to pump butane via pipeline to customers in the Southwest. Two similar 300 hp motors in this same area deliver propane also by pipeline.





250 hp Westinghouse a-c motor which powers a boiler feed water pump

Westinghouse: Single source for total electrical services to the industry. For information on how Westinghouse engineering services and products can help you realize major improvement in process cost and efficiencies, see your local Westinghouse sales engineer or write: Westinghouse Electric Corporation, Box 868, Pittsburgh 22, Pa. You can be sure . . . if it's Westinghouse.

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IT'S THE UNIFORM TORQUE That Does it!

- REDUCES PEAK TORQUE REQUIREMENTS UP TO 35%.
- LOWER PEAKS PERMIT USE OF SMALLER PRIME MOVERS.
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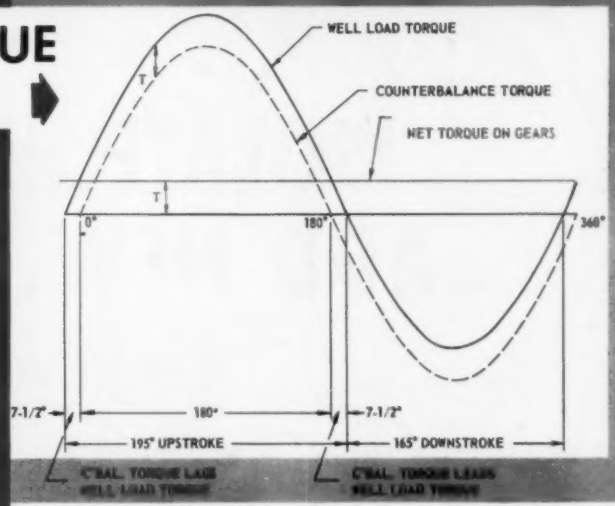
- UNIFORM TORQUE INCREASES GEAR AND BEARING LIFE.



HERE'S HOW . . .

By placing the pitman cross yoke forward of the vertical centerline of the crankshaft the upstroke occurs during 195° crank rotation and the downstroke 165°. This lowers the upstroke acceleration where the load is greatest, effecting a reduction of polished rod load.

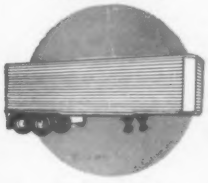
The forward position of the cross yoke substantially increases the mechanical advantage for lifting the load and reduces the advantage on the downstroke where the load is less.

The counterbalance weights, being offset approximately 24° on the crank, produce a counterbalance torque which "lags" the well torque at the beginning of the upstroke by 7½° and leads the well torque by 7½° at the beginning of the downstroke. (See illustration above)

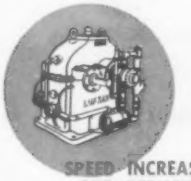
Independently, these features would not produce a uniform torque, but working together a "unitorque" system is obtained which in turn can effect a torque reduction on the gear reducer up to 35%.

PUMPING UNITS

GAS ENGINES



TRAILERS



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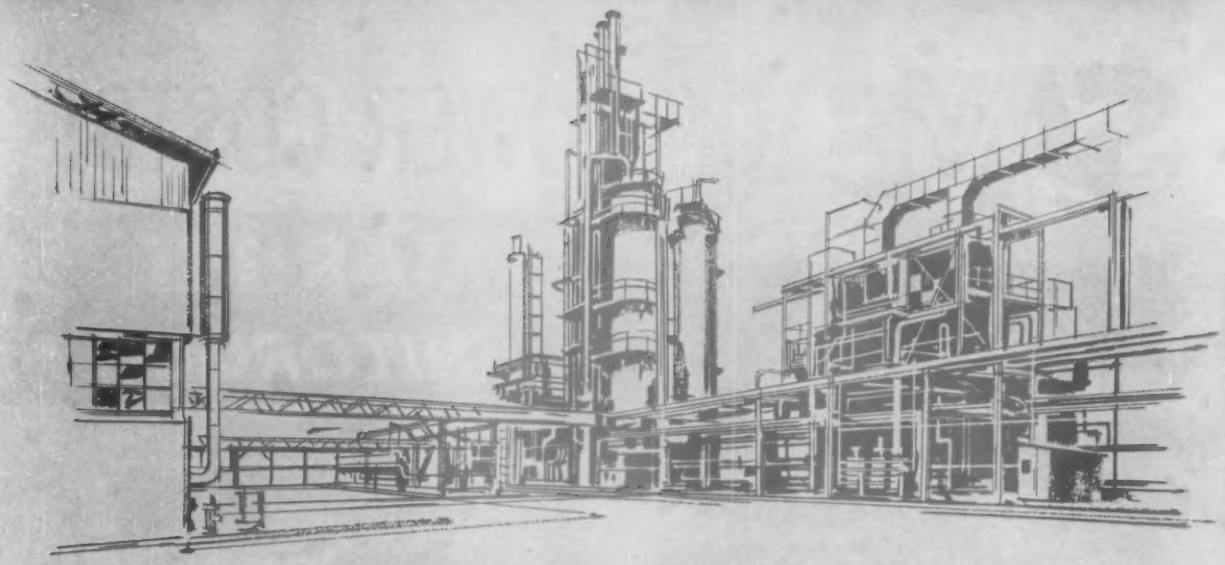


ISOLATE PIPE LINES ...ADD NEW EQUIPMENT

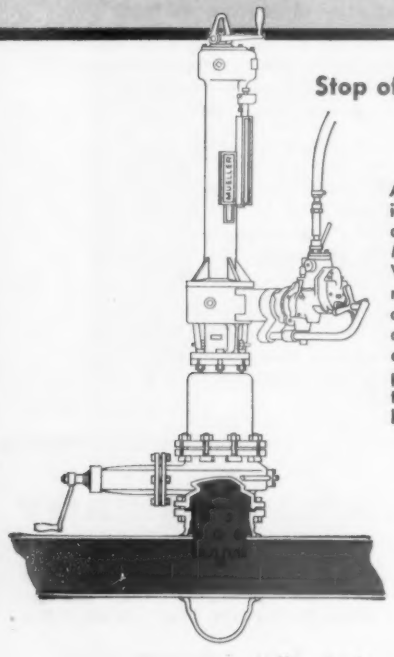
under pressure!

You can make repairs... isolate lines that need replacing... tie-in new piping... install new equipment—without interrupting flow or loss of production. There is no blowing of gas or fluids as you make permanent connections under full pressure and in complete safety.

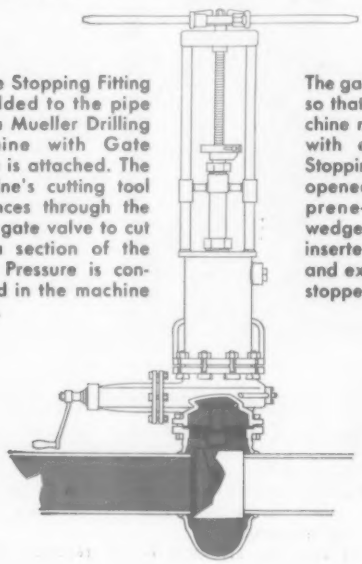
Mueller® No-Blo® methods and products enable you to work on piping systems whenever needed. A complete line of Mueller fittings, valves and equipment provides an answer to most every problem of working on lines under pressure.

Basic steps of Mueller No-Blo Methods are shown briefly in these illustrations...

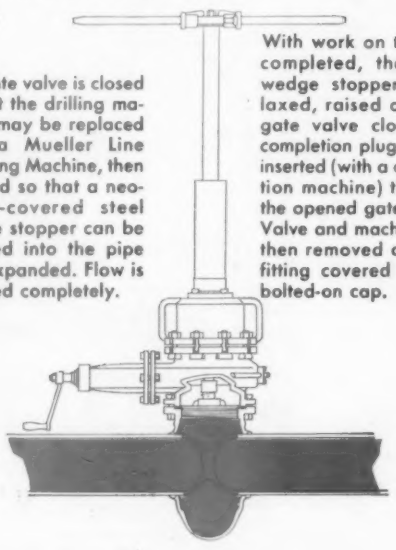
Stop off high pressure lines where no control valves exist—



A Line Stopping Fitting is welded to the pipe and a Mueller Drilling Machine with Gate Valve is attached. The machine's cutting tool advances through the open gate valve to cut out a section of the pipe. Pressure is contained in the machine body.



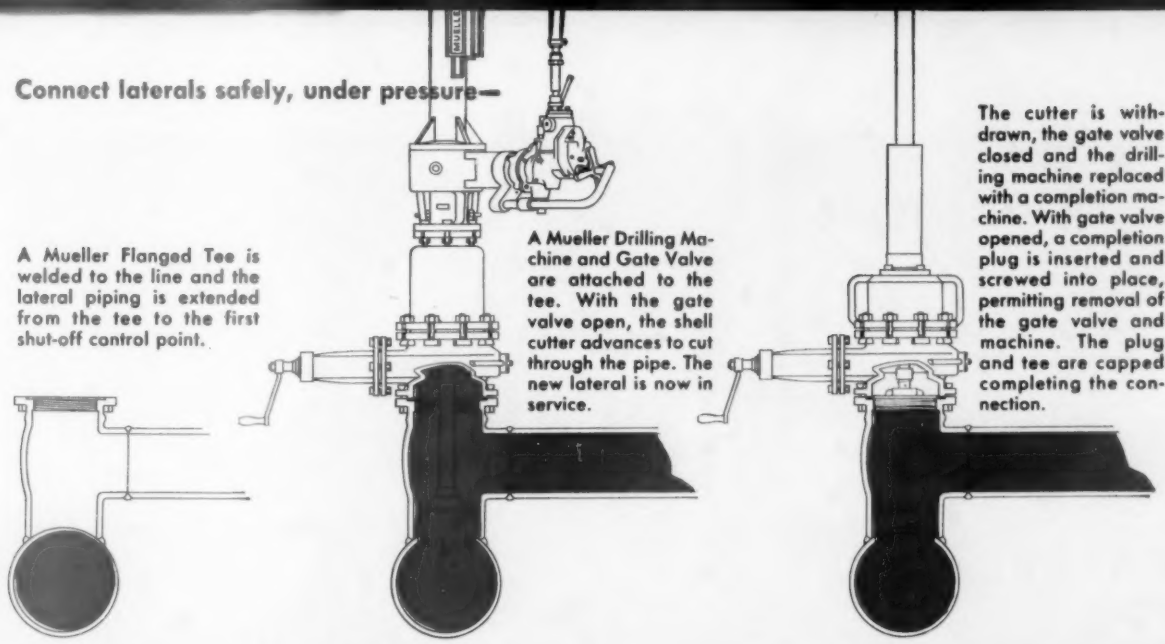
The gate valve is closed so that the drilling machine may be replaced with a Mueller Line Stopping Machine, then opened so that a neoprene-covered steel wedge stopper can be inserted into the pipe and expanded. Flow is stopped completely.



With work on the line completed, the steel wedge stopper is relaxed, raised and the gate valve closed. A completion plug is then inserted (with a completion machine) through the opened gate valve. Valve and machine are then removed and the fitting covered with a bolted-on cap.

Connect laterals safely, under pressure—

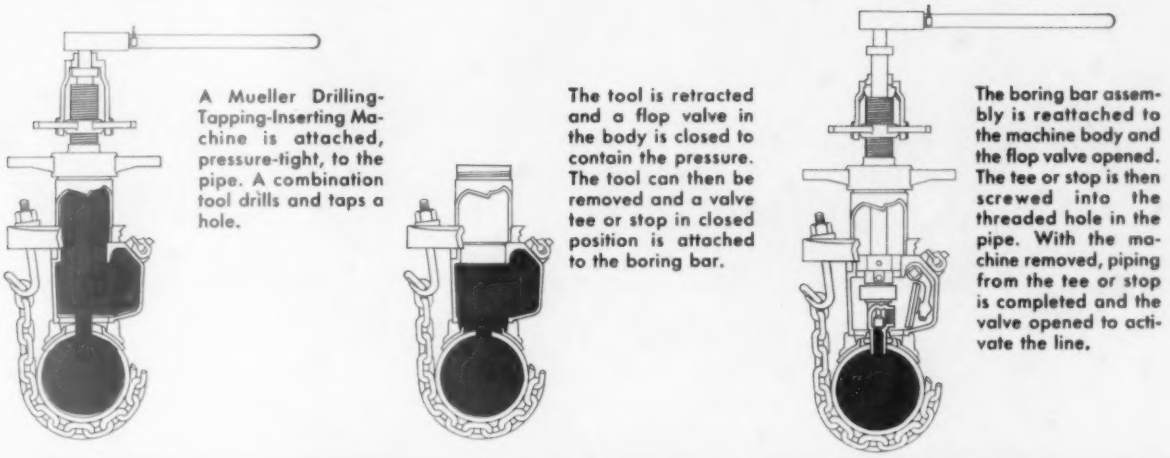
A Mueller Flanged Tee is welded to the line and the lateral piping is extended from the tee to the first shut-off control point.



A Mueller Drilling Machine and Gate Valve are attached to the tee. With the gate valve open, the shell cutter advances to cut through the pipe. The new lateral is now in service.

The cutter is withdrawn, the gate valve closed and the drilling machine replaced with a completion machine. With gate valve opened, a completion plug is inserted and screwed into place, permitting removal of the gate valve and machine. The plug and tee are capped completing the connection.

Tap a hot line without welding—



A Mueller Drilling-Tapping-Inserting Machine is attached, pressure-tight, to the pipe. A combination tool drills and taps a hole.

The tool is retracted and a flop valve in the body is closed to contain the pressure. The tool can then be removed and a valve tee or stop in closed position is attached to the boring bar.

The boring bar assembly is reattached to the machine body and the flop valve opened. The tee or stop is then screwed into the threaded hole in the pipe. With the machine removed, piping from the tee or stop is completed and the valve opened to activate the line.

Mueller No-Blo products to save time and money:

Completion Machines — For fittings through 12". Working pressures to 500 p.s.i. Working temperatures to 250° F.

Flanged Tees—Sizes from 3" through 8". Pressure ratings to 1200 p.s.i. Temperature ratings to 500° F.

Valve Tees — Sizes through 2". Welding or threaded inlet and/or outlet. Pressure ratings to 1200 p.s.i. (Machine inserted Valve Tee — 250 p.s.i.)

Line Stopper Fittings — Sizes from ¾" through 12". Welding or mechanical joints. For steel, thin-wall steel or cast-iron pipe. Pressure ratings to 1200 p.s.i.

Small Drilling Machines — Drill ½" through 2½". Working pressures to 1200 p.s.i. Working temperatures to 500° F.

Line Stopper Units—Stop-off ¾" through 12" lines. Working pressures to 500 p.s.i. Working temperatures to 250° F.

Large Drilling Machines—Cuts to 12". Working pressure to 500 p.s.i. Working temperatures to 500° F. Power or hand-operated.

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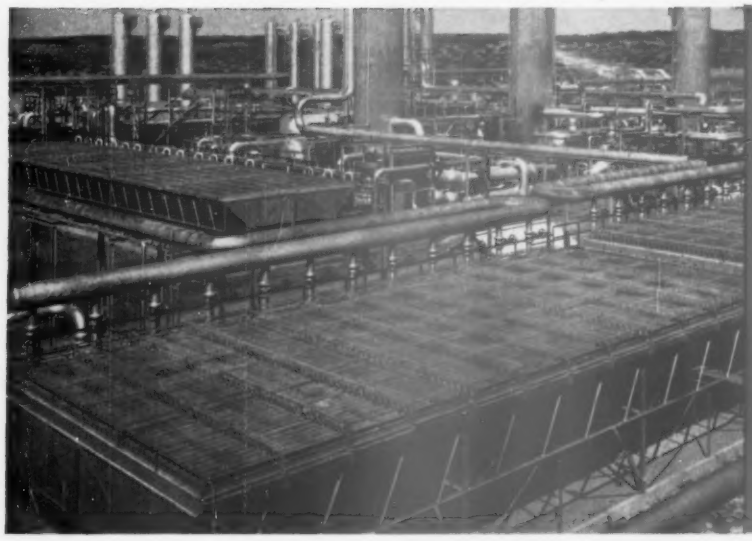
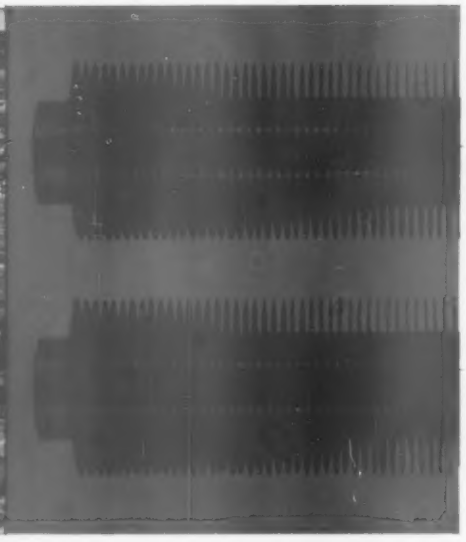
IT'S CHEAPER TO KILL HEAT WITH AIR





COMPARE TRANSAIRE . . . no matter what your water situation. Transaire air-cooled heat exchangers already have found wide acceptance in areas where water cooling is impractical or impossible. And now, finding that Transaire is less expensive to operate, even where water is plentiful, other areas are turning to this economical unit.

Simple in basic design, Transaire units are being used in many varied operations where low maintenance and low operating costs are important over extended periods of time. The high heat transfer efficiency is attained by use of the Yuba fintube. Its exclusive design employs tapered spiral fins mechanically bonded so that the entire base tube is covered and protected against the galvanic action that destroys efficiency in many other types of fintube. Both fins and base tubing can be provided in almost any material, size or gauge desired. Fin spacing and height can be varied to requirements. It's cheaper to kill heat with air — next time compare Transaire, a product of Yuba, pioneers in air-cooled heat exchangers.

Yuba also manufactures a complete line of shell and tube heat exchangers, and will recommend either type, whichever is required or best suited for the job.

YUBA

specialists in heat transfer equipment

YUBA HEAT TRANSFER CORPORATION
Tulsa, Oklahoma

YUBA CONSOLIDATED INDUSTRIES, INC.

Sales Offices in Chicago • Houston • Los Angeles • New York • Pittsburgh • San Francisco

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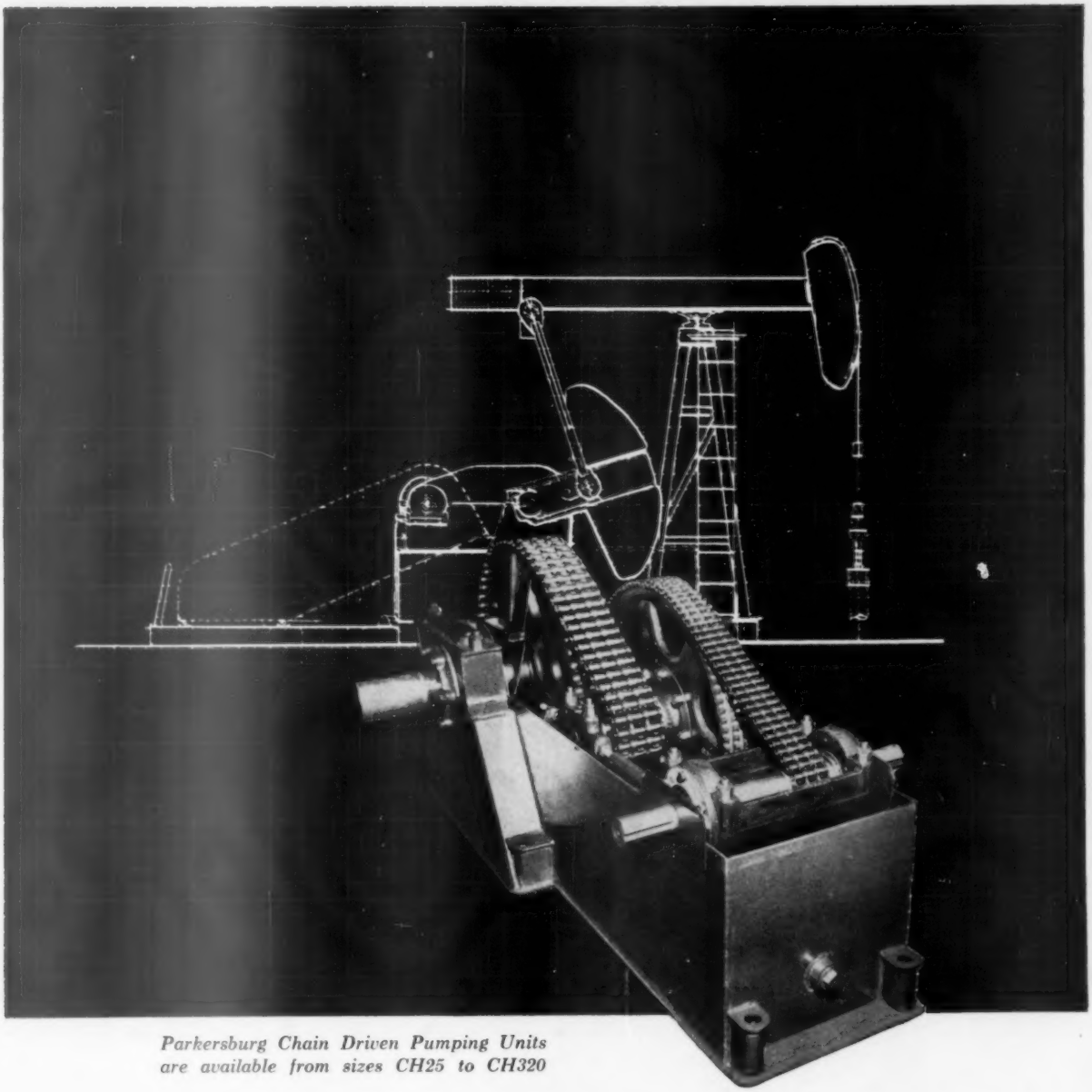

Parkersburg Chain Driven Pumping Units are available from sizes CH25 to CH320

DESIGNED FOR LEADERSHIP The Parkersburg Chain Reducer — heart of the Parkersburg Chain Driven Pumping Unit — is designed to give you outstanding performance for many years. We start with the rigid all-welded case and precision tapered roller bearings on all shafts. Then we select the chain drive with a liberal safety factor to give you long life and reliability.

Precision heat treated chain and machined flame hardened sprockets insure minimum wear. Operating in a bath of light oil, all parts are thoroughly lubricated for minimum friction and long life. Adjustment of chain for wear is easy. In short, that long, trouble-free operation — for which Parkersburg Units are famous — is designed into them.

When you need a pumping unit, get a Parkersburg Chain Driven Unit.

Parkersburg

Division of Parkersburg-Aetna Corp.

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NEW BELLOWS FLOW TRANSMITTER

gives you field indication plus convenience and precision

You get all the economy and convenience of pneumatic transmission and all the efficiency of the bellows meter body plus field indication, when needed, in the new Honeywell Bellows Flow Transmitter. Use it in any application to transmit flow or liquid level measurements in open or closed tanks.

This new meter has automatic ambient temperature compensation and two-way overload protection for 100% of rated meter body pressure. Maintenance is greatly simplified by modular construction which lets you remove any major component by loosening two screws. All field adjustments are easily accessible, and a self-locking feature prevents upset after calibration adjustments are made.

New Bellows Transmitter is available with a concentric scale or as a non-indicator. It has 16 ranges—from 0-10 inches of water to 0-400 inches of water.

You can change ranges in the field simply by removing a single spring assembly and replacing it with an assembly of the desired range . . . adjust damping quickly and accurately, while the instrument is in operation . . . install the meter with either vertical or horizontal piping, so that it vents, drains and purges itself. The meter transmits with calibrated accuracy of ±0.5% of full scale, and indicates within ±1.0% of full scale.

For complete details on the new Bellows Flow Transmitter, call your nearby Honeywell field engineer. Or write MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.—In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell

First in Control

SINCE 1885

The Arithmetic of Materials Handling

Fuller pneumatically conveys drilling mud directly into oil rig bins, from specially-fitted Bourg Mud & Chemical Co. supply ship. Ship carries 250 tons of mud, delivers at a rate of 50 tons an hour.

Sea-Going Fuller Pneumatic Conveying System Cuts Time and Cost of Vital Drilling-Mud Deliveries

The Bourg Mud & Chemical Co., Inc., of Lockport, La., is making off-shore deliveries of drilling mud by advanced Fuller pneumatic systems.

The dry mud is automatically pumped aboard oil rigs from a Fuller equipped cargo ship at a rate of 50 tons an hour—one man replacing large crews handling 100-pound sacks in cargo nets. Previously, bag handling in high seas had been either dangerous or impossible. The highly flexible bulk-handling system now operates safely and efficiently at all times.

Self-emptying hoppers designed and built by Delta Tank Manufacturing Company installed into the Bourg ship are fitted with F-H Airslide® fluidizing gravity conveyors. A 6-inch Fuller-Kinyon pump transfers the aerated material to bins aboard the rig—over distances up to 300 feet. Air pressure is supplied by a diesel-driven Fuller single-stage vane-type rotary compressor.

Here is a good example of Fuller's engineering experience and wide range of equipment combining to solve your materials handling problem. If you handle large volumes of dry bulk granular materials, why not investigate a simple, efficient Fuller pneumatic conveying system? For details, write or call Fuller today outlining your problem.

1311
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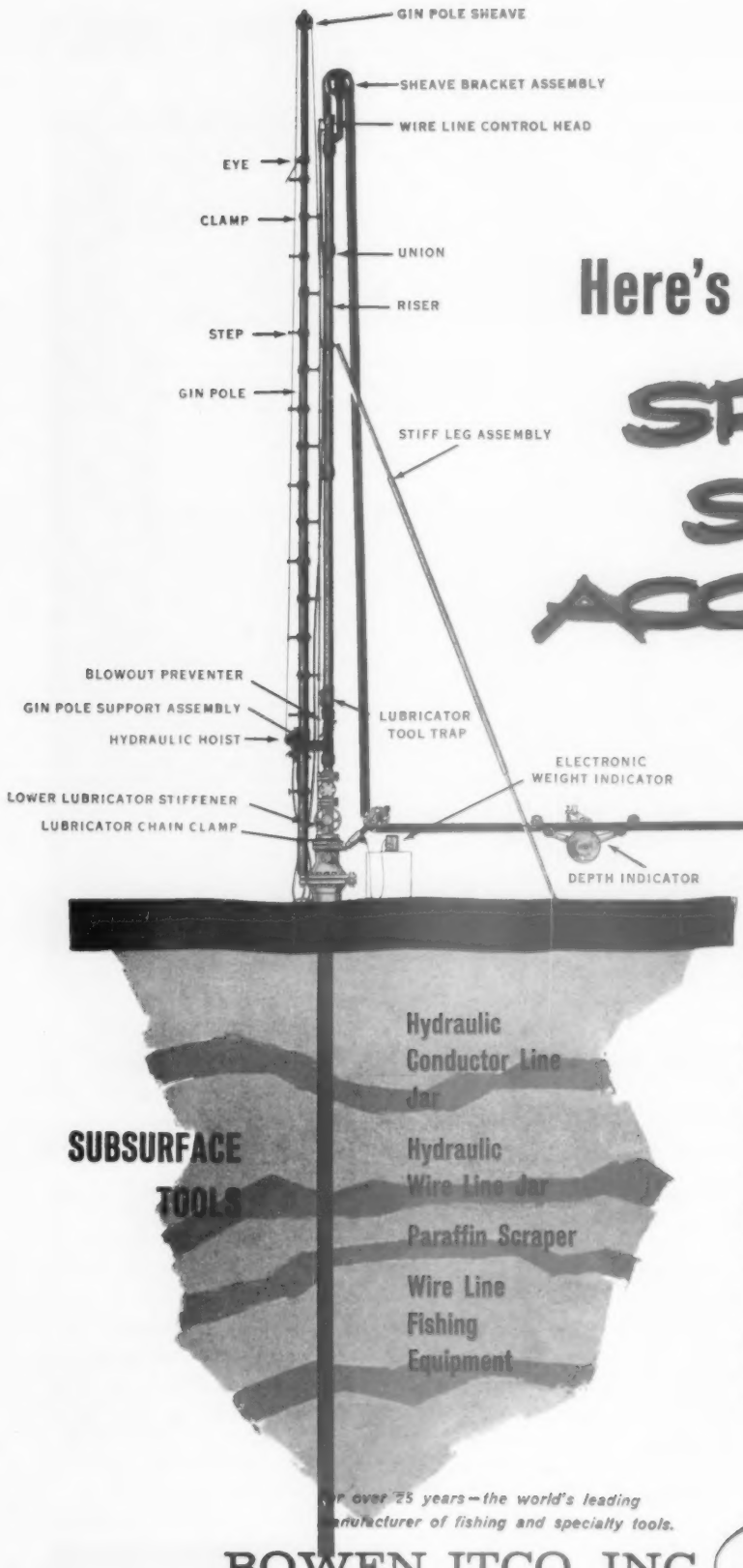

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The economic advantage of wire line services is dependent on the speed, safety and accuracy with which they are conducted. BOWEN-EQUIPPED WIRE LINE SERVICE COMPANIES provide the utmost in dependability and economy.

Your favorite service company is probably Bowen-equipped now. On your next wire line job, look for the familiar Bowen equipment. It is your guarantee of faster, safer, more accurate completions — dependable and economical service.

Bowen tools make wire line services better. Don't settle for less than the best, **insist on Bowen Wire Line Equipment!**

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THIS IS THE BEST WAY TO LOAD TANKERS-
And the heart of this system is the swivel joint. Produced by a company with 30 years of experience in solving flexible line problems. Proven by hundreds of installations around the world on Chiksan's Hydraulic Marine Loading Systems and other dockside loading lines. Recommended and preferred for safety and long life by responsible men everywhere. It is a **CHIKSAN** Swivel Joint.

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Better Production Tools Through Research

OTIS Equipment NEWS

Volume III, Number 3 Otis Engineering Corporation • Dallas *Production Equipment and Services*

Now...An Otis Flow Line Safety Valve And Pilot For Only $295.00

Proven Otis Safety Valve Design Costs Less Than Many "Substitute" Safety Devices

DALLAS—An all new flow line safety valve employing the time-proven Otis Safety Valve design is now available for installation on wells requiring shut-in protection in the event of flow line breakage. The new valve, designated the Type K Otis Flow Line Safety Valve, may be purchased in the popular 2-inch, 3,000 p.s.i. screw-end size complete with a new Type BE Otis Low Limit Pilot for $295. The Type K Valve is also available with flange-end connections at slightly higher cost. The valve and pilot are designed to automatically shut in a well when flow line pressure drops below the pre-set limit of the pilot. The pressure drop may be due to a break in the flow line itself or the malfunction of auxiliary equipment downstream of the valve. The new Type K Valve and BE Pilot combination offers oil and gas producers effective Otis Safety Valve protection at a new low price — a price which in many cases is lower than that of substitute safety devices such as diaphragm - operated motor valves, etc.

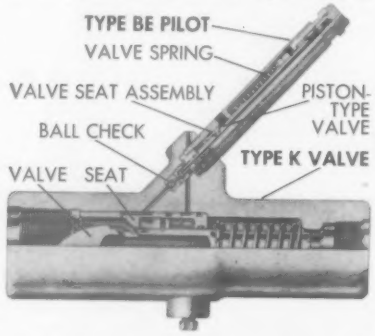
PRICES — TYPE K VALVE AND BE PILOT COMBINATION

Size — Type End	Working Pressure Rating (p.s.i.)	Price
2" — Screw	3,000	$295.00
2" — Screw	5,000	335.00
2" — Flange	3,000	345.00
2" — Flange	5,000	385.00

Note: Be sure to specify pressure range for pilot.

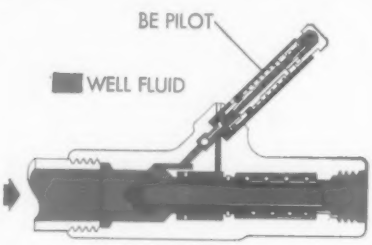
Valve Operating Principles

The Type K Otis Flow Line Safety Valve is a pilot-controlled pressure-operated safety valve designed to automatically shut in a well in the event of abnormal changes in pressure on the flow line or when control pressure from an external source rises above or falls below that for which the pilot is set. On installations where pressure from within the flow line is to serve as the pilot control medium (see schematic drawings), flow line pressure is equalized across the valve and the pilot to permit a spring in the safety valve to hold the valve piston off seat. When pressure within the flow line falls below the set pressure of the pilot, the pilot is designed to exhaust the pressure from behind the valve piston. This action serves to create a differential across the valve and allow flow to close the valve instantaneously. The valve is designed to be reopened by screwing in the nut on the pilot which acts to force the ball check in the pilot boss off seat to equalize pressure across the valve. When installed with the Type BE pilot, the valve serves to provide low-pressure protection. If both high and low pressure protection is desired, the Type E Otis Pilot is recommended. For remote protection, the Type N & P Otis Pilot combination is available.



Pilot Operating Principles

The Type BE Low Limit Pilot is a spring-loaded, pressure-actuated control pilot designed to actuate the Type K Otis Flow Line Safety Valve in the event of a drop in flow line pressure below the pre-set limit of the pilot. The pilot consists of a body, a piston-type valve and valve seat, and a valve spring. When installed on a Type K Valve, a port in the safety valve body, the pilot seat assembly, and the pilot valve serves to admit flow line pressure to the pilot. This pressure acts to hold the pilot valve on seat against the force of the valve spring. In the event of a pressure drop across the valve and pilot, the spring within the pilot is designed to force the pilot valve off seat, permitting the pilot seat assembly to move up so that the ball check in the safety valve boss can seat. This action serves to exhaust pressure within the valve, create a pressure differential across the valve and permit the valve to close.



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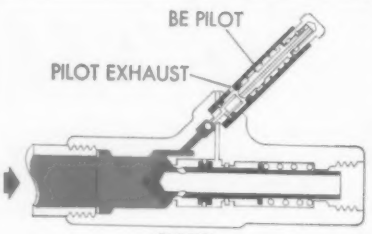

CLOSED

Valve and Pilot Design Advantages

Both the Type K Otis Flow Line Safety Valve and the Type BE Otis Low Limit Pilot are of the simplest design and construction to provide reliable and positive operation. The flow path through the Type K Otis Flow Line Safety Valve has been engineered to permit high flow volumes with a minimum pressure drop. The valve was also designed with no small ports or natural body traps to avoid areas in which hydrates and/or paraffin might accumulate to foul the valve's operation. Both the valve and pilot are so designed as to permit each to be used with other Otis Safety Equipment.

Otis Surface Safety Valves and Pilots have long been recognized as the very finest. Otis Safety Valve Specialists have earned the same enviable reputation. Whatever your well safety valve requirements, Otis can be of help. For more information on Otis Safety Equipment, or for help with a specific safety valve installation problem, call the Otis office nearest you, or write Otis, Dept. 3-E, P.O. Box 35206, Dallas 35, Texas. You'll find experienced Otis Safety Valve Specialists ready to help you — anxious to serve you . . . with the widest variety of field-proven safety valves and pilots available today.

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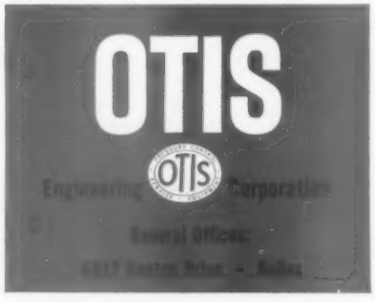


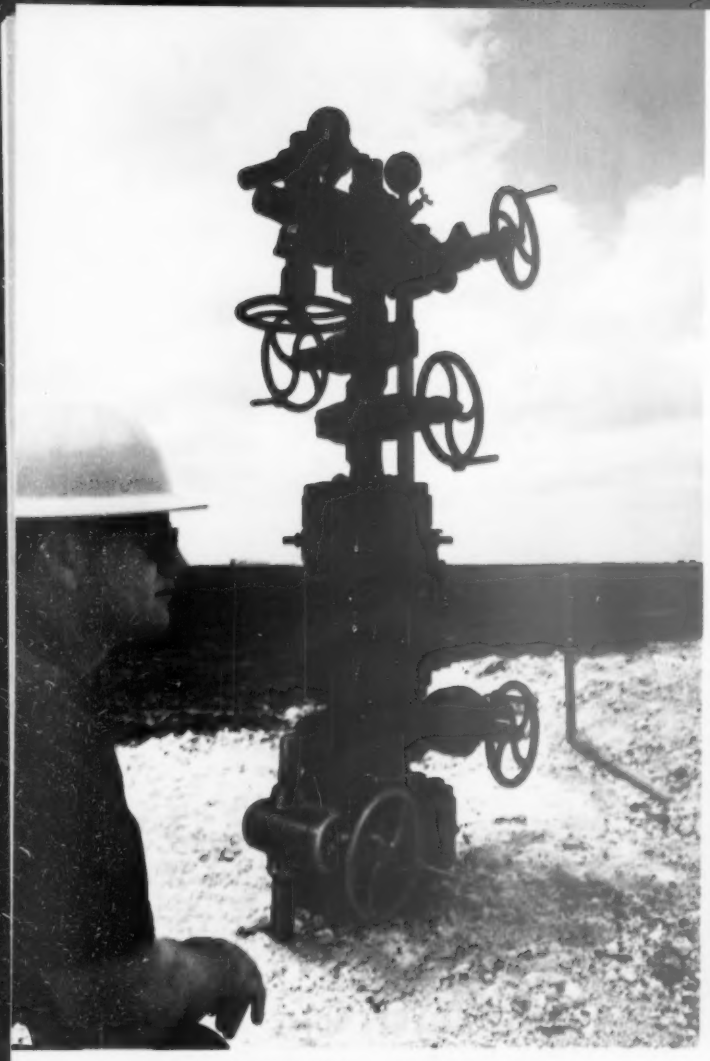
Complete choice of tank battery hookup connections available at National Supply

Next time you buy components for tank battery hookups be sure to call your National Supply representative, or visit your closest National store.

You'll find a complete choice of hookup components, including Victaulic grooved fittings and Larkin swage nipples and bull plugs. Some of the other famous products you'll find readily available are Rockwell valves, Weco unions, Tube Turns welded connections and Stockham fittings.

Tank battery components are only a small part of the oil country inventories stocked in National Supply stores for your convenience. Literally thousands of products are available right now in 120 National Supply stores, conveniently located to serve your needs. These products are all manufactured by leading companies in their respective fields.

No matter what your needs, from small fittings to complete rigs, next time you buy call National Supply.



NATIONAL DUAL STRING—operating in South Texas.

NATIONAL TRIPLE STRING—installed near No Trees, Texas.

Now! Basic National Multiple String

National Supply now offers multiple string wellheads in versatile designs for all requirements, ranging from low pressure pumping to high pressure gas or oil wells.

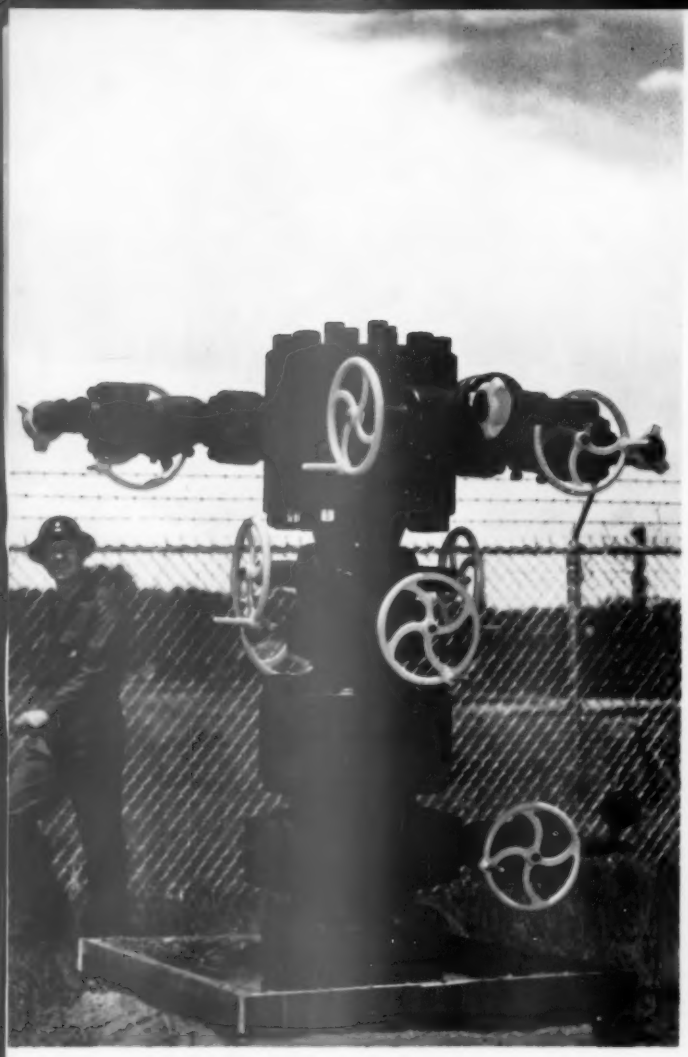
Starting with independent dual string installations in the early 1950's, National continues to be a leader in the development of multiple string wellhead equipment. For example, in 1960 National designed, assembled and tested the equipment for the world's first quintuple string completion.

National multiple string wellheads provide many design features that result in wellhead leadership. Here are a few:

Self locating, interchangeable hangers—A wide choice of hanger styles for use in one standard wellhead body.

Completion control—Individual strings can be run, landed and packed prior to removal of preventers, and back pressure valves can be used to plug the tubing.

Maximum flexibility and safety— Each tubing string can be run or pulled and the individual strings can be rotated without picking up the preventers.



NATIONAL QUADRUPLE STRING—installed in South Texas.

NATIONAL QUINTUPLE STRING—in operation 40 miles off the Louisiana coast.

Wellheads to meet any requirement

Sealed in steel—The Laurent seal* isolates each tubing string for the life of the well. Supplemental or plastic packing is not required.

Tubingless completions—Multiple string hangers for use in standard flanged National Type B casing head bodies.

Every product is subjected to rigorous testing procedures. These not only include conventional methods, but, especially in hydrostatic testing, special methods considerably more severe than those specified by A.P.I. standards.

*Patent No. 2,687,229

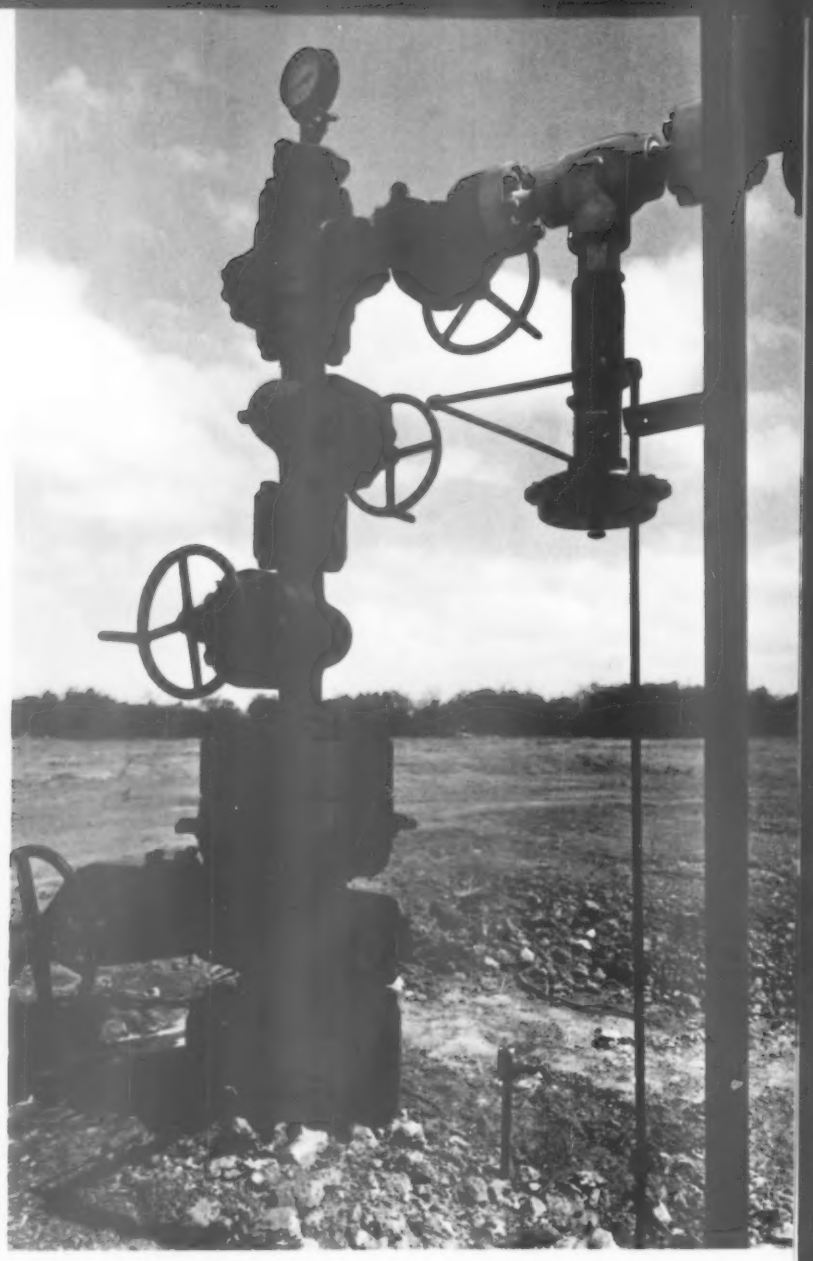
National has a staff of wellhead specialists to work with your organization in selecting the exact unit to meet your requirements. This organization, with many years of successful field experience, is expert in multiple completion work.

It will pay you to call your National representative next time you buy a multiple string wellhead. He has experience, products and information you can profitably use. Or write to National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pennsylvania.

Steel's Symbol of strength, long life, and economy

Steel

NATIONAL TYPE B WELLHEADS are a full-opening line, designed for use with full-bore blowout preventers and drill-through valve equipment. Design offers interchangeability, ease of installation and safety. Type B wellheads are readily available in a complete range of sizes, with working pressures up to 15,000 p.s.i.



Why National Type B Wellheads have never contributed to a casing failure

Separation of pipe and pressure loads in National Type B wellheads prevents overloading of casing wall . . . protects the string from collapse or deformation. This is one of many reasons why National Type B wellheads are frequently used for record depth wells.

Some other features:

Pressure actuated packing that assures positive packoff between strings . . . seals automatically . . . eliminates questionable field adjustments.

Secondary packing keeps corrosive fluid away from ring joint and permits pressure crossover in casing and tubing spools.

Removable bit pilot economically adapts body members to required casing size. Only one element is required.

Maximum interchangeability of parts permits changing completion methods to suit well conditions . . . saves money in salvage operations.

Your National Supply representative can tell you about many other field-proven Type B wellhead features. Call him soon, or write to National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pa.

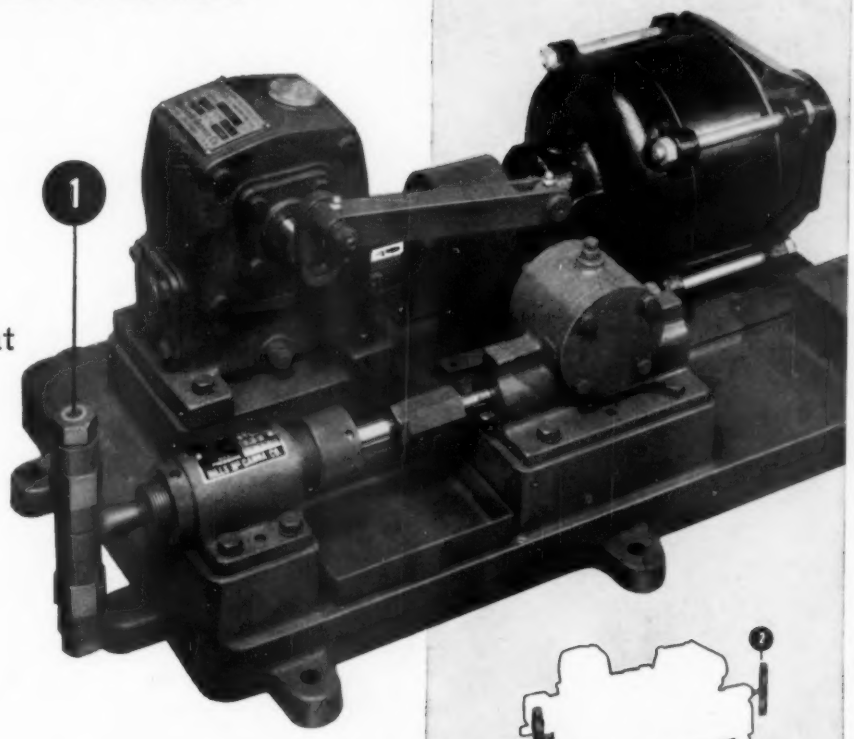
ARMCO National Supply Division

HILLS-McCANNA

Add-on Metering Pumps

let you buy only what you need today...add to it tomorrow if your requirements change

Hills-McCanna Model "U" pump, single feed



. . . a second feed can be added to a pump with a two-feed base

. . . or a second, third, or fourth feed can be added to a pump by using a four-feed base

When you buy a Hills-McCanna metering pump, you are buying appreciable built-in protection against obsolescence caused by changing process requirements.

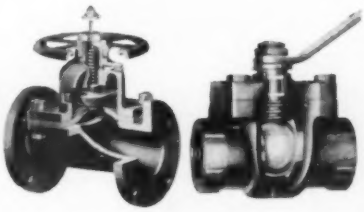
Add-on construction makes it possible to modify pumps already in the field. Feeds can be added as illustrated. Optional micrometer screw stroke adjustments to permit change in feed rate while the pump is operating can be installed. Standard heads can be replaced with jacketed liquid ends for pumping materials requiring refrigeration or heat. All-plastic liquid ends (Penton or PVC) can be supplied. Automatic controls can be added. Variable speed arrangements are available.

No matter what your chemical metering or proportioning application, you'll be money and satisfaction ahead with versatile, reliable Hills-McCanna pumps. The line is complete—capacities from 0.10 to 980 gph, pressures to 30,000 psi.

For specific recommendations, write today for literature, outlining your particular requirements.

Optional micrometer screw stroke adjustment can be added at any time

Hills-McCanna also manufactures a complete line of diaphragm valves 1/2"-16"; ball valves 1/4"-12"; and magnesium alloy castings.



HILLS-McCANNA COMPANY

400 MAPLE AVENUE, CARPENTERSVILLE, ILLINOIS

Hills-McCanna (Canada) Ltd, 1920 Mattawa Avenue, Summerville (Toronto), Ontario

P-61-1

Steel

PHOTOGRAPH BY PAUL WELLER

THE FINER TOUCH

Accuracy. By a steelmaking specialist. Ladle a sample. Test. Check again and again ■ Much may depend on tiny pellets of alloying metal in a furnace of molten steel. The strength of a bridge or a fractionating tower. The corrosion resistance of a processing vessel. Accuracy is essential to the skilled builders of these vital projects. ■ And accuracy is a characteristic long associated with Lukens—in producing the highest-quality carbon and special-duty plate steels and head shapes. In researching the best steels for difficult applications. The Lukens Application Research team would welcome the opportunity to work with your engineers on problems that involve designing with plate steels. Please write, or call collect, Manager of Application Engineering, 43-D Services Building, Lukens Steel Company, Coatesville, Pennsylvania.

THE SPECIALIST
IN PLATE STEELS

LUKENS STEEL

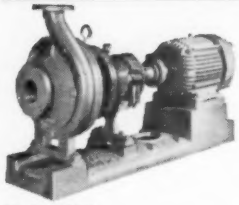
COATESVILLE, PA.

GOULDS PUMPS, INC.

Dept. OGJ-101, Seneca Falls, New York, specialists in pumps

The largest plant of its kind in the world *plus* over 100 years' experience in pump manufacturing—that's what equips us to answer all your liquid-handling needs. You have a wide line of Goulds pumps to choose from. Complete details on any pump are available in the Bulletins indicated. Write for your copy.

ATLANTA • BOSTON • BUFFALO • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA • PITTSBURGH • SHREVEPORT • TULSA • REPRESENTATIVES EVERYWHERE

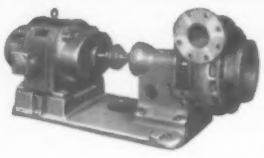


Model 3195

INTERCHANGEABLE CHEMICAL PUMPS

11 pump sizes with same overall length, 23 in. Capacities to 775 GPM, heads to 300 ft. tdh. Working pressures to 275 psig. Standard in ductile iron, 316 stainless steel, Gould-A-Loy 20. Handles liquids to 500°F. Maximum interchangeability of parts and dimensional interchangeability of models give you greatest flexibility and coverage.

BULLETIN 725.1.

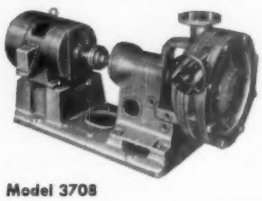


Model 3755

FRAME MOUNTED CENTRIFUGALS

Built in 24 sizes, with capacities up to 4000 GPM and heads up to 400 ft. Designed for standard electric motor drive; readily adaptable for belt drive. A substantially built line for general and special applications with many new improvements.

BULLETIN 715.1.

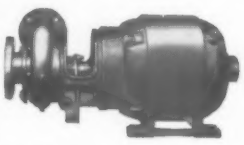


Model 3708

GOULDS-PFAUDLER GLASSED PUMP

Revolutionary new pump designed for handling corrosive liquids. All parts in contact with liquid are glass—fused to metal. Handles all acids except hydrofluoric, and all alkalies to pH 12. Four sizes, with capacities to 700 GPM, heads to 140 ft.

BULLETIN 725.2.

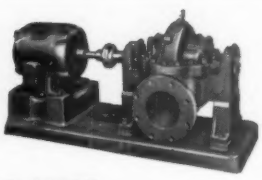


Model 3655

CLOSE-CUPLD CENTRIFUGALS

Single-stage pumps built in 23 sizes with a capacity range from 5 to 2000 GPM and heads up to 400 ft. Embody top horizontal discharge, closed impeller, machined stuffing box, fully protected shaft. Wearing parts easily renewable.

BULLETIN 710.1.

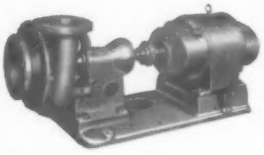


Model 3405

DOUBLE-SUCTION CENTRIFUGALS

Capacities from 100 to 6400 GPM. Heads up to 525 ft. Three shaft and rotating parts assemblies provide for 70 sizes and 140 pump combinations. Horizontally split casing.

BULLETIN 721.6.

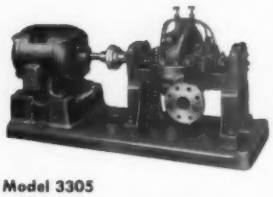


Model 3189

OPEN IMPELLER CENTRIFUGALS

Highly efficient open impeller pumps available in 13 sizes for both motor and belt drives. Capacities up to 3000 GPM, with heads up to 180 ft. at 1750 RPM. Well suited for irrigation, general industrial processes, and slurries.

BULLETIN 720.4.

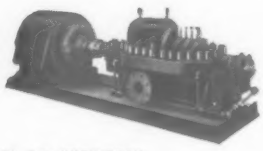


Model 3305

TWO-STAGE CENTRIFUGALS

Ten sizes provide heads up to 1000 ft., capacities to 3000 GPM, depending on heads. Horizontally split casing. Opposed impellers, with labyrinth diaphragm for maintaining thrust balance.

BULLETIN 722.6.

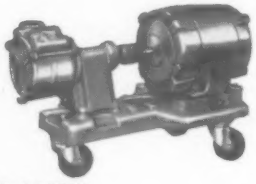


Models 3330-3360

MULTI-STAGE CENTRIFUGALS

Medium- and high-pressure multistage pumps. Model 3330 is furnished in sizes from 3 to 8 inches, 2 to 6 stages, with capacities ranging from 40 to 2100 GPM, heads to 950 ft. Model 3360 furnished in 3, 4, 6, and 8 inch sizes, up to 8 stages, with capacities ranging from 50 to 2600 GPM, heads to 3400 ft.

BULLETINS 722.1 and 722.4.



Model 2520

CENTRIPETAL SCAVENGER PUMP

Centripetal action lets it pump liquid, air, liquid *and* air. Use it for transfer, cleaning-up, or pilot plant operations. Compact, lightweight, portable. All-iron or stainless steel construction. Capacities to 60 GPM, heads to 80 ft.

BULLETIN 725.6.

MODULAR VERTICAL PUMPS

SUMP

For pit depths to 20 ft. in 6 inch increments. Both wet and dry pit types available in capacities up to 3180 GPM, heads to 190 ft. Single and duplex units. Full automatic control. Modern design using standard parts permits quick shipment at most economical cost.

BULLETIN 726.2.

PROCESS

Especially designed for handling corrosive liquids in the chemical process and allied industries. Normally supplied in 316 stainless steel constructions, but materials to suit user's requirements can be furnished on application.

Capacities to 720 GPM. Heads to 190 ft. For heavy-duty service under most severe applications.

BULLETIN 727.1.

GOULDS PUMPS

FOR NEWS ABOUT THIS OUTSTANDING ADVANCE, TURN PAGE

Introducing the "WHITE LINE"

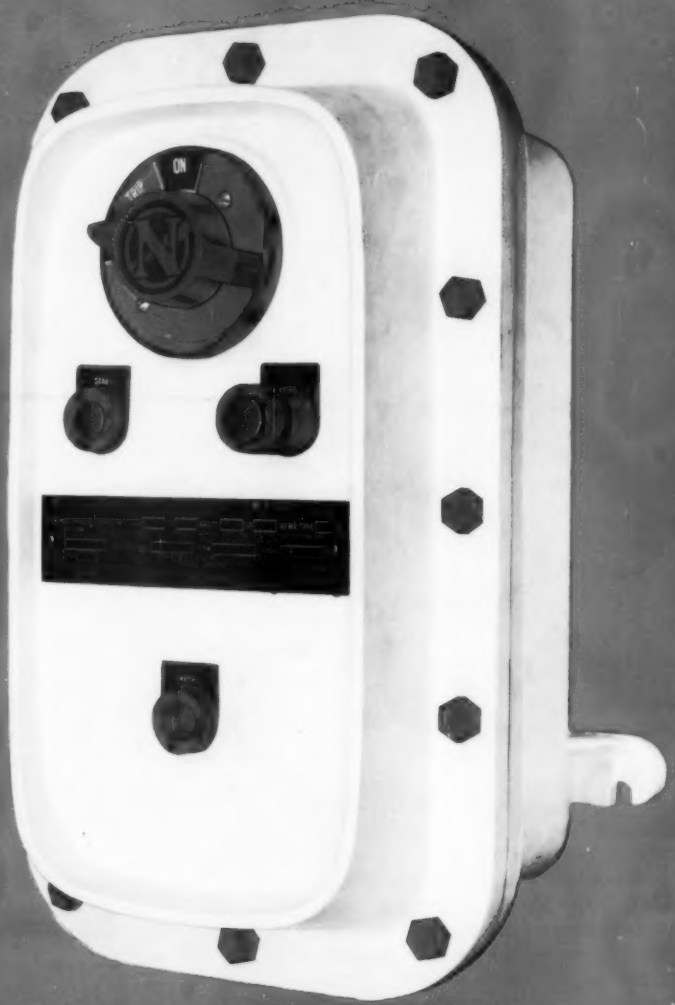
The first ALL-NEW line of special purpose enclosures in 25 years. (NEMA 4, 5, 7 and 9)

NEW COMPACT SIZE

NEW PLUG-IN COMPONENTS

NEW FUNCTIONAL APPEARANCE

NEW QUICK-OPEN COVER



NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA

P. O. BOX 5385 NATIONAL 7-5530

NELSON ANNOUNCES COMPLETE NEW LINE STARTER & CIRCUIT BREAKER ENCLOSURES

A completely re-designed line of starter and circuit breaker enclosures for hazardous and special purpose applications is now being produced by Nelson Electric Manufacturing Company, Tulsa.

In making the announcement, H. A. Norberg, president of the firm, said "Although we have been an important producer and a leading supplier of electrical equipment for hazardous locations for over twenty years, we have not been satisfied with the approach to such equipment — neither ours nor our competitors.

H. A. Norberg

"To find the solution, we sent our marketing team to customers to discuss their problems. After this research was behind us, we engaged Mr. Wayne Porter — an outstanding industrial designer — who established the basic appearance of our new line.

"When we arrived at what was thought to be the final product, we built prototypes and took them to major users of this kind of equipment — over 100 design and maintenance engineers and purchasing people in the petroleum, petro-chemical, steel, milling and other industries. The men we talked with were most helpful. They spent hours with our marketing people, going over the new equipment. They told us what they liked, and what they disliked.

"After the survey, changes were made to incorporate most of the ideas brought out by interview. Now we have it. We call it the *White Line*. We feel sure it is the shape of things to come in electrical control equipment. And we invite you to become familiar with it at your earliest opportunity."

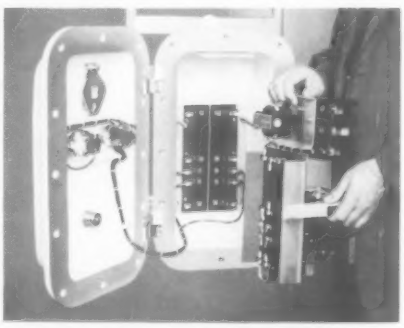
Nelson's new White Line Circuit Breaker includes enclosures for circuit breakers up to 1,000 ampere size. Notice the compact, rectangular design.

ELECTROL PLUG-IN COMBINATION STARTER IS STAR OF WHITE LINE

Prominent among the many advances found in Nelson's *White Line* is a new concept for hazardous area starters— the *Electrol*. These new starters were designed to satisfy modern requirements in today's automated refineries and chemical plants.

The new *Electrol* features complete plug-in components to make change-out a matter of minutes rather than hours. Critical processes are back on the line fast. Line, load and control wiring are all disconnected when the interior is removed. Both starter and circuit breaker, with optional extras such as control transformer, are pan mounted and are removed or inserted without the use of tools. The *Electrol* design — which requires from 23% to 50% less mounting space than competitive makes — includes starters through sizes 4.

For those who desire conventional mounting, non plug-in interiors are available at competitive prices. Sizes 5 and larger are available only in non plug-in design.



Plug-in feature of Electrol combination starter features line, load and control plug-in. Enclosures can be opened, plug-in components removed and replaced, enclosure closed and returned to service within three minutes.

NEW WHITE LINE BY NELSON FEATURES DESIGN CHANGES

One of the most striking changes is the white color of the enclosures. White is the best heat reflective color. This helps keep the interior cooler; in fact, 20° cooler by test — which results in less nuisance tripping and more accurate selection of overload heaters.

The white paint used has a specially selected vinyl base for maximum resistance to corrosion and abrasion. The use of white will eliminate the need of repainting enclosures after installation since the white blends with any color scheme.

The shape of the new *White Line* enclosures is both functional and eye appealing. Fewer flange bolts are required because the enclosure is tailored to the equipment. The bolts are stainless steel, captive type which eliminates lost bolts and fumbling around. In addition, they are the quick-thread type — only one-and-one-half turns are necessary for removal. The raised ridge on the cover is more than decoration; it strengthens the cover and provides a protective recess for hand controls.

Covers on the new *White Line* are hinged to the box, except on the very smallest breakers. This makes servicing simpler and faster since the cover swings out of the way. There is nothing to interfere with complete access to the interior, no heavy pieces to lift and hold in place, and no way to drop the cover on the ground.

Designed to use every major brand of starter and circuit breaker, the *White Line* allows customers to keep spare parts inventory at a minimum, because they may specify the brand on which they have standardized.

Mounting of the new units is simple — due to a new 3-point mounting. This means the enclosure is always solid with no stress when mounted on uneven surfaces. The unit is easier to install, too. After installing the top mounting bolt, the enclosure may be hung on it leaving both hands free to put the remainder of the bolts in place. All *White Line* cast enclosures are available in either iron or aluminum.

In addition to the new starter and circuit breaker enclosures, the *White Line* also includes cast iron and aluminum junction boxes, lighting panels, control stations and power distribution panels.

Photographed at DX Sunray Oil Company, (Tulsa Refinery)

For a higher yield per dollar—Aerocat Triple A

Why more and more refineries are increasing efficiency and cutting costs with this 25% Alumina Catalyst. AEROCAT TRIPLE A® Cracking Catalyst, the first commercially successful 25% alumina catalyst, is still setting records. Its combination of extremely high activity and unusual stability provide premium cracking efficiency, high equilibrium activity, increased conversion at lower temperatures, or (compared to conventional, low alumina catalysts) reduced catalyst usage at severity levels.

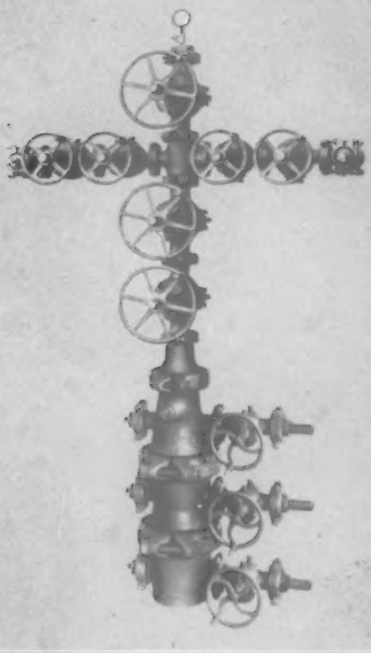
Yet, with all its efficiency, AEROCAT TRIPLE A can actually save you money, compared to other synthetics of comparable performance—particularly where low catalyst turnover is possible. It yields *more* gasoline; it measurably increases octane rating, and with no increase in stack losses of the catalyst itself. The increased output takes place at the expense of a lower dry gas yield.

Isn't it time you investigated what AEROCAT TRIPLE A can do for *you?* Your Cyanamid salesman—"The Man with the Golden Rule"—will be glad to cooperate, for sharing his skill and experience with refiners is a most important part of his job. Why not call him *now?*

Basic in catalyst chemistry

CYANAMID

AMERICAN CYANAMID COMPANY • REFINERY CHEMICALS DEPARTMENT • BOUND BROOK, NEW JERSEY



It's Lighter . . .

It's Simpler . . .

It's Faster . . .

Comparison	Flanged Assembly	Grayloc Assembly
Working Pressure	10,000 psi	10,000 psi
Weight	6,591 #	4,878 #
Height	136″	111″
Complexity	8-24 studs per connection	2-3 studs per connection

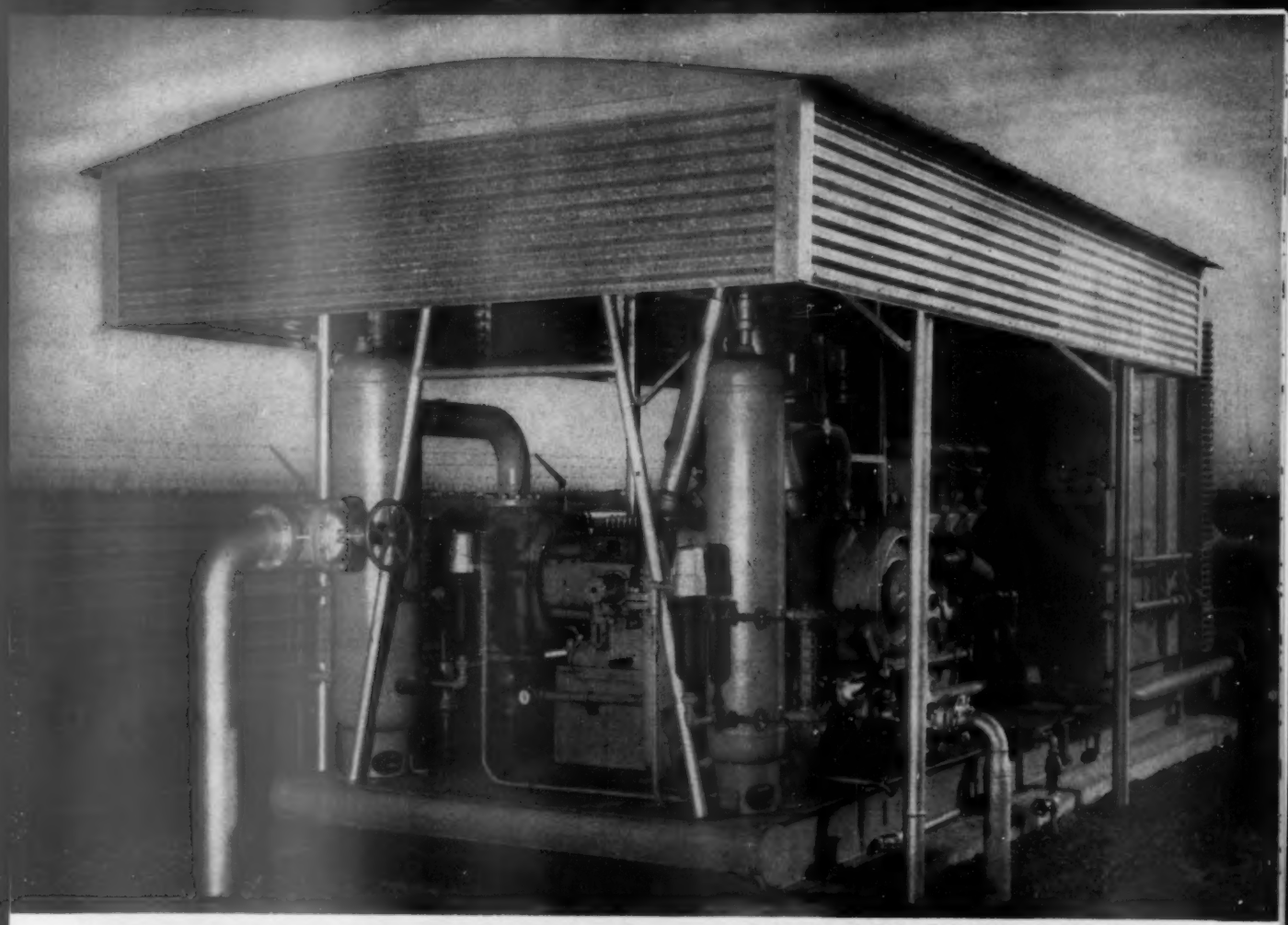
THAT'S WHY GRAY WELLHEAD ASSEMBLIES are BETTER BECAUSE OF GRAYLOC CONNECTIONS

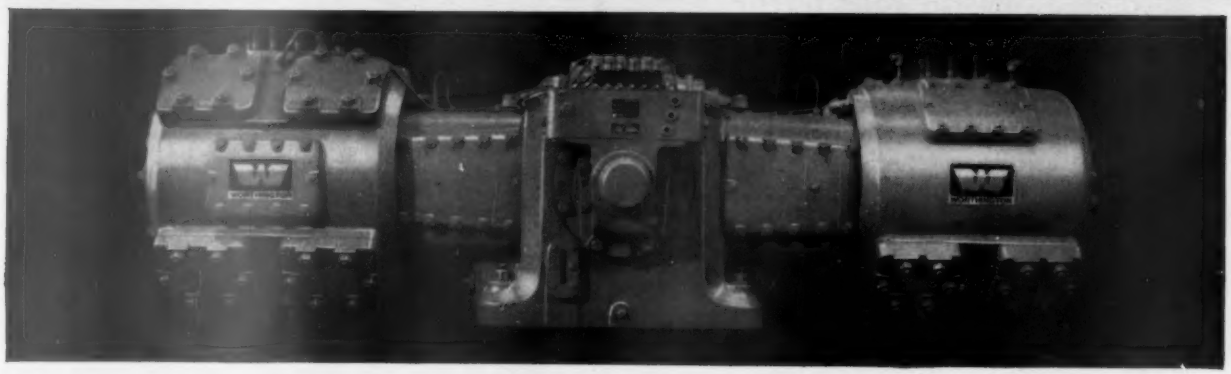
These comparisons are made between a flanged assembly and a *Grayloc*® assembly, both having a test pressure rating of 15,000 psi. No matter what the pressure — or the point of similarity where you start your comparison — you will find that *Grayloc* connected wellhead assemblies can save you labor, time and effort that results in a substantial saving of production dollars.

Whether your particular interests are in high or low pressure, single or multiple completions, Gray wellhead assemblies can help make your production operations less expensive. For full details and specific engineering information, write for the Gray catalog.

GRAY *Tool Company*

6104 P. O. BOX 2291 HOUSTON 1, TEXAS RIVERSIDE 7-1240





SHOULD YOU TAKE GAS FROM A WELL?

There's a big difference in opinion about when it is profitable to take gas from a well. It depends on price contracts, on company policy of time limit on payout, on alternatives for capital investment and on other factors, such as the economics of the well itself. To lower your well cost picture, Worthington now offers the new CUB compressor.

Through a wide range of cylinder sizes, the CUB handles over 85% of gas field needs. The cylinders are designed for extremely fast field changes to meet changing capacities and pressures.

The CUB cylinder-and-piston arrangement is balanced-opposed. This cuts vibration to a level below other compressor designs. It reduces supporting base requirements and lengthens compressor life.

Main crankshaft bearings in the CUB are the more expensive, spherical-roller-bearing type. You'll find it runs with less friction, runs cooler, and maintains better full end-thrust control.

Lubrication in the CUB is improved, too. Oil is continuously cleaned by a built-in filter that is readily serviced without disturbing piping. All lubrication is done by a full, force-feed system. And crankcase oil is water-cooled down to a conservative operating temperature by an oil cooler enclosed in the frame itself.

You'll find, too, that the CUB is compact to make an easier installation. Piping is less, only one water inlet and two water outlets. There are no external oil pipe connections.

For more information on the CUB, write Worthington Corporation, Section 36-19, Harrison, N. J. In Canada, Worthington (Canada) Ltd., Brantford, Ontario. Or call your local compressor packager.

WORTHINGTON

PRODUCTS THAT WORK FOR YOUR PROFIT

NEW CONCEPT IN EMULSION TREATING

combines **PETRECO** *Electric Precipitation with* **TRET•O•LITE** *Chemicals*

Carefully engineered to offer petroleum producers a new concept in crude oil emulsion-breaking performance, the new PETRECO* Chemelectric Treater blends the time-proved effectiveness of PETRECO electric precipitation and TRET-O-LITE* chemical demulsification . . . the vapor conservation of a closed pressure vessel . . . and the added utility and economy of a built-in low-pressure de-gassing section.

*Registered trademark, Petrolite Corporation

Requires Little or No Heat

By eliminating the usual demulsifying heat requirement, and by treating in a vapor-tight pressure vessel, the light ends are conserved, true A.P.I. gravity is maintained, and volume losses from vaporization are avoided. You have more crude to sell, at a higher price. The easily-installed, fully-automatic PETRECO Chemelectric Treater also saves fuel and minimizes scale and corrosion problems.

Doubled Throughput

In field operation on a West Texas lease, one 6′ PETRECO Treater dehydrated over twice as much oil in a given time as did a 6′ thermochemical unit and did so at an 85°F. lower temperature. Water content of the PETRECO-treated crude was 50% less. Basic sediment was reduced from .2% to zero. A.P.I. gravity averaged 1.1 points higher.

The cost of this unique new equipment is less per installed barrel of capacity than old-style systems. The PETRECO Chemelectric Treater requires no more chemical than for conventional treating and normally consumes less than 1 KW/hr. of electricity. For further information or a specific quotation, write or call . . .

PETROLITE CORPORATION

SUBSIDIARY AND AFFILIATED COMPANIES

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CE-61-1

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4. Strong enough for any casing seat.
5. Strong enough to permit hydraulic fracturing.
6. Easy to mix, easy to pump.

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For complete Laboratory Data call your local Trinity Representative or write Dallas Office, P. O. Box 2698 or phone RIverside 2-8111.

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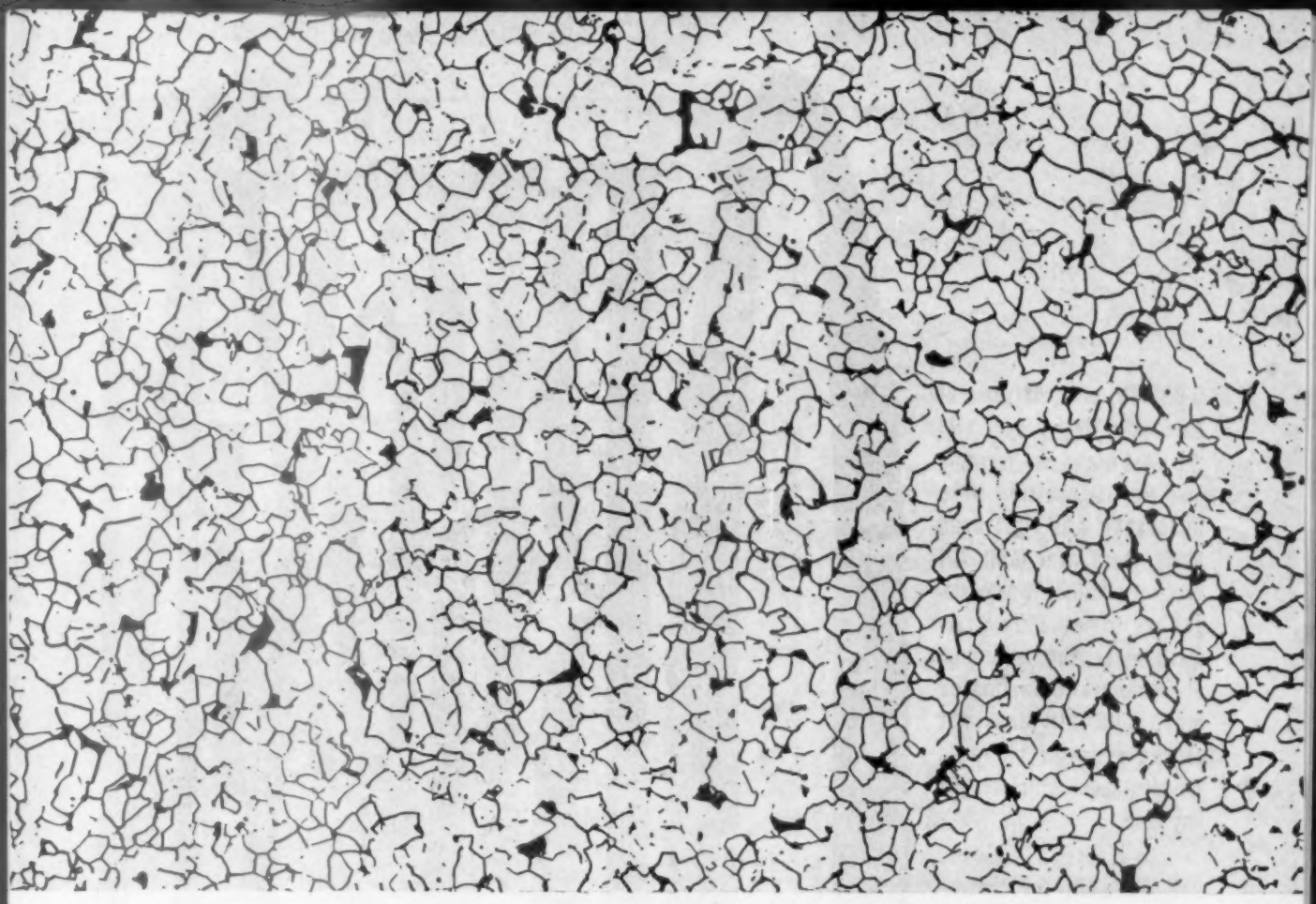

Can you spot the weld in this picture?

If you can't see a weld in this magnified photo of a steel tube, there's nothing wrong with your eyesight. Even though the weld section has been magnified 100 times, you can't see the weld because it's perfect—but you could spot a flaw immediately. That's why we use metallographic examination like this to check Electric Resistance Welded Pressure Tubes. In addition to checking the weld, we also examine the grain structure of the steel tube to make sure it's consistent.

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THEY SAY

2 plus 2 = ?

Dear Sir:

My arithmetic is poor or else yours is. See Page 78 of the October 16 issue. In the table, the column in the yellow box (1970) under "Free-world energy market" adds up to 110 instead of 100 by my reckoning.

F. H. Yeargers
Mid-Continent
Area Manager
Schlumberger Well
Surveying Corp.

It's our addition that's at fault, along with our typesetting. The figure for "natural gas" should be 20 instead of 30%, as it appears. This would make the correct total 100. As it was printed, the column adds up to 110.—Ed.

Producers' import plan

Dear Sir:

According to The Oil and Gas Journal, consideration is being given in the Department of Interior to revising the present crude-oil import program.

As we see this program, it has been principally a means of subsidizing the refining phase of the domestic petroleum industry and largely has been ineffective in helping the domestic producers and the contractors who do our development and exploratory drilling.

Drilling statistics show that the number of wells drilled each year in the United States steadily increased to 58,418 in 1956 and since that time has declined nearly 20% to 46,778 wells in 1960. Present indications are that a further decrease in drilling will take place in 1961.

It is our belief that the welfare of the country demands that this trend be reversed. Instead of the present program which subsidizes the domestic refiners, we suggest a program which will subsidize the domestic producers. If our memories are correct, aid to small producers of petroleum was the original object of the program.

Our idea of how this should be done is relatively simple in principle.

We propose that each producer be given a quota to import oil in

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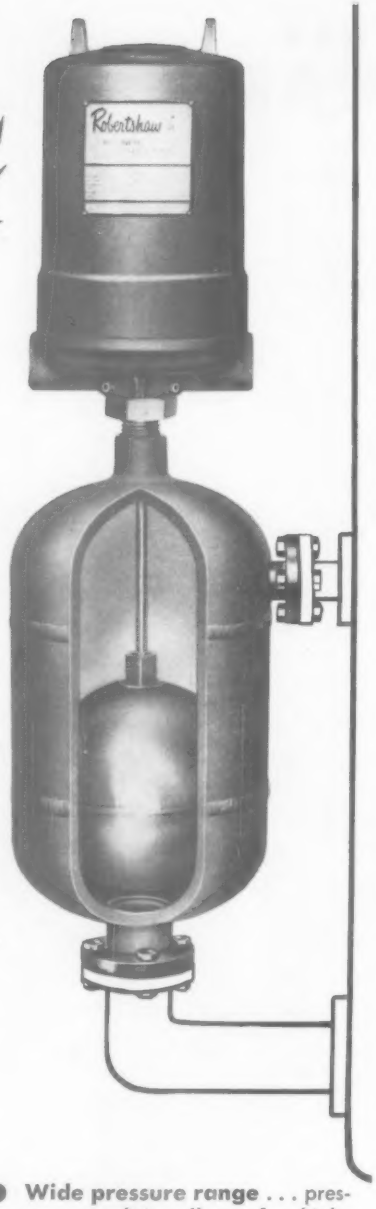

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- **Wide pressure range** . . . pressure-equalizing floats for high-pressure applications.
- **Fewer moving parts** for trouble-free operation, lower cost.
- **"High-load" snap switch** . . . avoids need for leveling.

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proportion to his productive capacity with relation to total domestic productive capacity. The producer could then dispose of his quota if he so desired to a refiner and thus obtain a subsidy in money which will compensate him for productive capacity he is not permitted to use.

This will provide each producer with an incentive to seek more production and increase his productive capacity and, if successful, get a reward in the form of a larger import quota.

A refiner's domestic production, plus quotas of others acquired, would then determine the amount of foreign oil which could be imported by each refiner. Once import quantity has been set, there would be no necessity for the Oil Import Administration to be burdened with allocating imported crude oil, as this would be automatic when producers have specified their productive capacity and been assigned their initial import quota. State agencies could be expected periodically to verify productive potentials of producers.

If we assume, for example, that domestic crude production capacity is 9 million barrels daily, that the Oil Import Administration has authorized 1 million barrels of crude import, then each domestic producer would be entitled to an import quota of one-ninth, or 11%, of his potential production.

We think it is the turn of the producers in this country to get a break.

R. G. Tracie, E. P. Bowler
Consultant petroleum engineers

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

OCTOBER

29-31 Independent Petroleum Association of America, annual meeting, Shamrock-Hilton Hotel, Houston.

29-Nov. 1 National Lubricating Grease Institute, annual meeting, Rice Hotel, Houston.

29-Nov. 10 Northwestern University, Transportation Center, executive seminar on transport costs, prices, and profits, Evanston, Ill.

30-Nov. 1 National Association of Corrosion Engineers, northeast region conference, Hotel Statler, New York.

NOVEMBER

1-3 Southwest Federation of Geological Societies, annual meeting, Hilton Hotel, El Paso, Tex.

2-3 Society of Petroleum Engineers of

SIX REASONS WHY O·C·T CASING HANGERS OUTPERFORM OTHERS

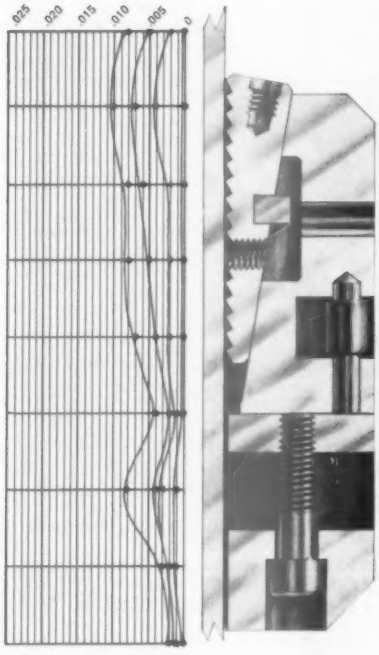

Fig. A.

The curves above show inward diametrical deflection of 5½-inch J-55 casing suspended in a C-22 casing hanger. Deflection is plotted in 0.001-inch units at 9 points. Test loads were 60,000, 120,000, 180,000, and 230,000 pounds.

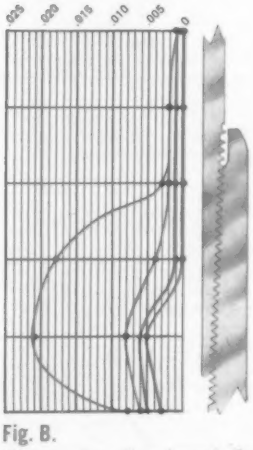

Fig. B.

These curves show inward diametrical deflection of a standard API coupling at various points. During the pull tests, this coupling was placed below the C-22 casing head for which deflections are shown in Fig. A. Deflections plotted in Fig. B were observed at the same time and at the same loads as those in Fig. A.

1. Slips in O-C-T casing hangers cause only minimum casing deformation. For example, a typical O-C-T hanger, the C-22, actually **causes less deformation than a standard API coupling!** Results of pull tests at casing loads up to 230,000 pounds appear in Figures A and B. These results mean that O-C-T casing hangers cause little reduction of casing I.D., giving you full-bore access for tools. These hangers also give you dependable casing suspension, with no danger of slipping caused by excessive pipe deflection.

2. O-C-T's slip-bowl design (See Fig. A) gives you automatic shock-absorbing action that protects casing heads by converting a large part of any sudden load shock into a downward force component. This helps explain the remarkable fact that **no O-C-T casing head has ever split in service!**

3. O-C-T's slip-bowl hanger design does not allow seat wear to change the angle of the slips. Many other hangers with slips that engage the casing head directly no longer remain at the proper angle as seat wear occurs.

4. The 45° angle of O-C-T casing head seats gives superior load-bearing qualities and reduces compression forces on casing. Many other hangers are designed with 7-10° seat angles that produce excessive compression.

This test equipment was used to obtain deflection data presented in Figures A and B. The hydraulically operated device at left can test tubing and casing hangers at loads as large as 1,000,000 pounds.

5. O-C-T casing hangers are always designed to provide all the practical load capacity needed in properly designed casing strings.

6. Weight is evenly distributed on packing in O-C-T hangers automatically. Many other hangers require manually setting screws to distribute weight properly.

For more information on the design advantages you get from O-C-T casing hangers, see your O-C-T representative. His know-how and experience are at your disposal from the time you start planning your completion until your O-C-T wellhead is set in place.

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AIME, annual California regional meeting, Hacienda Motel, Bakersfield, Calif.

2-3 API, annual agriculture - petroleum seminar, Louisiana State University, Baton Rouge.

2-3 Southern Gas Association, research and development roundtable conference, Shreveporter Highway Hotel, Shreveport, La.

2-4 Geological Society of America, annual meeting, Cincinnati, Ohio.

5-9 Society of Exploration Geophysicists, international meeting, Denver.

6-8 Chemical Institute of Canada, conference of the chemical engineering division, Royal York Hotel, Toronto.

8-11 National Oil Jobbers Council, meeting, Morrison Hotel, Chicago.

9-10 Society of Automotive Engineers, national fuels and lubricants meeting, Shamrock-Hilton Hotel, Houston.

13-15 American Petroleum Institute, forty-first annual meeting, Conrad Hilton, Congress and Palmer House hotels, Chicago.

15-17 University of Texas, Department of Petroleum Engineering, natural gas engineering conference, Austin.

16 Illinois Oil and Gas Association, annual meeting, Mount Vernon, Ill.

17 Natural Gas Processors Association, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.

26-Dec. 1 American Society of Mechanical Engineers, winter annual meeting, Statler-Hilton Hotel, New York City.

27-Dec. 1 National Association of Corrosion Engineers, southeast region conference and Florida general conference short course, Key Biscayne Hotel, Miami.

DECEMBER

3-6 American Institute of Chemical Engineers, annual meeting, New Yorker Hotel, New York City.

4 AIME's Society of Petroleum Engineers, Arizona section, annual meeting, Pioneer Hotel, Tucson.

4-6 Interstate Oil Compact Commission, annual meeting, Denver Hilton Hotel, Denver.

5-6 National Petroleum Refiners, Association, computer conference for refiners, Hotel Tulsa, Tulsa.

JANUARY

7-10 Pipe Line Contractors Association, annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

8-12 Society of Automotive Engineers, annual meeting, Cobo Hall, Detroit.

16-18 Kentucky Petroleum Marketers Association, annual meeting and convention, Brown Hotel, Louisville, Ky.

17-19 National Association of Corrosion Engineers, Canadian region eastern division conference, King Edward Hotel, Toronto.

19 Natural Gas Processors Association, Gulf Coast regional meeting, Robert Driscoll Hotel, Corpus Christi, Tex.

24-26 American Society of Mechanical Engineers, second symposium on thermophysical properties, Princeton University, Princeton, N. J.

31-Feb. 1 National Petroleum Refiners Association, Gulf Coast regional meeting, Ben Milam Hotel, Houston.

FEBRUARY

4-7 American Institute of Chemical Engineers, national meeting, Statler Hotel, Los Angeles.

14-17 Pipe Line Contractors Association of Canada, Castle Harbor Hotel, Bermuda.

15-17 Southwestern Legal Foundation, annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

16 Natural Gas Processors Association, South Louisiana regional meeting, Lafayette Petroleum Club, Lafayette.

18-22 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, New York City.

22 Chemical Institute of Canada, protective coatings division, Seaway Hotel, Toronto.

23 Chemical Institute of Canada, protective coatings division, Windsor Hotel, Montreal.

27-Mar. 2 International Oil and Gas Educational Center, institute on economics of the gas industry, Southwestern Legal Center, Dallas.

28-Mar. 2 American Petroleum Institute Division of Production, southern district meeting, Rice Hotel, Houston.

MARCH

2 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

4-8 American Society of Mechanical Engineers, gas turbine-process industries conference, Shamrock Hilton Hotel, Houston.

6-7 National Petroleum Refiners Association, eastern regional meeting, Sheraton-Cleveland Hotel, Cleveland.

15-16 Society of Petroleum Engineers of AIME, economics and valuation symposium, Dallas.

16 Natural Gas Processors Association, Oklahoma regional meeting, Sheraton-Oklahoma Hotel, Oklahoma City.

19-22 Kentucky Petroleum Marketers Association, management institute conducted by the University of Louisville, Brown Hotel, Louisville, Ky.

21-23 New England Gas Association, an-

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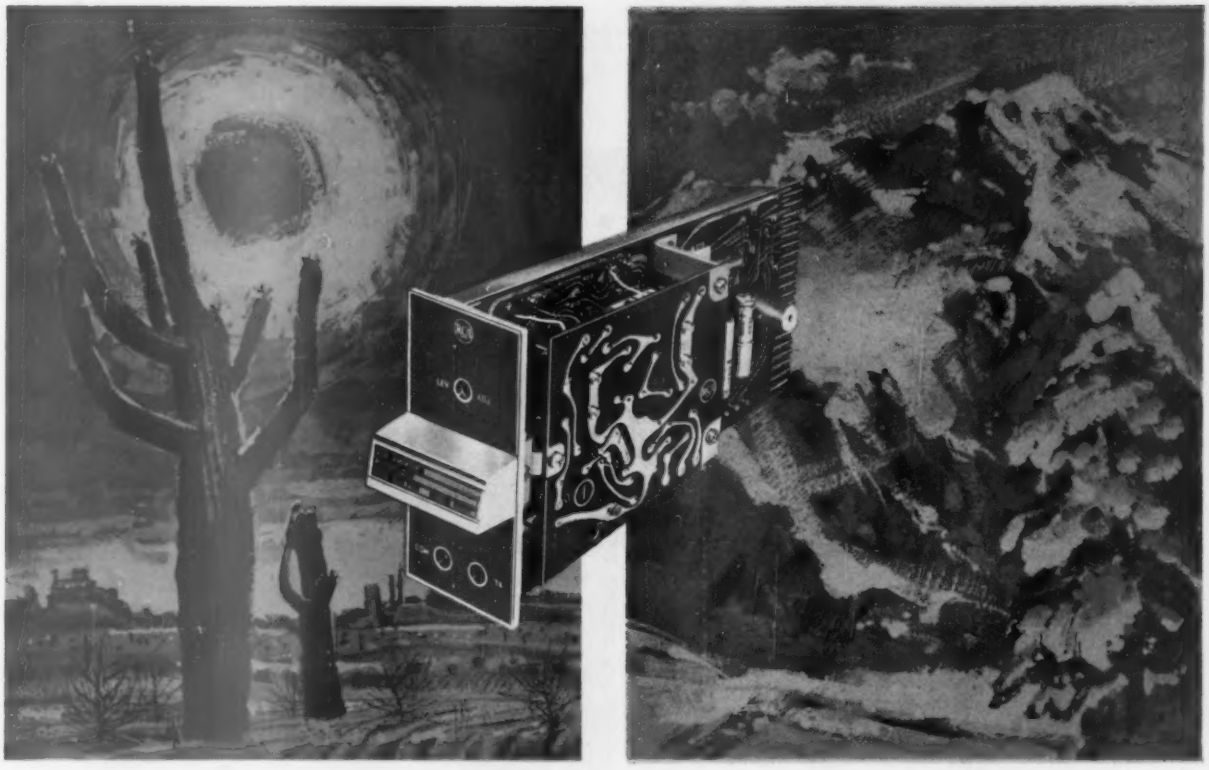

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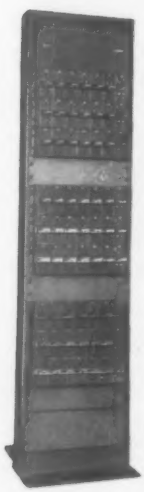

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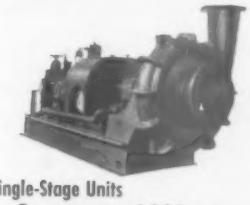

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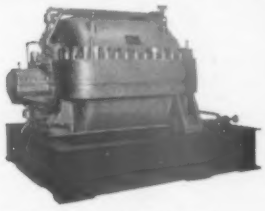
Capacities to 700,000 cfm



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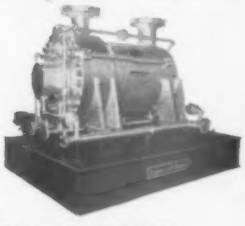
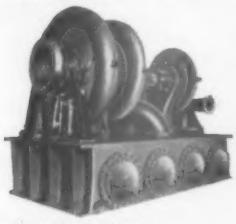
Capacities to 200,000 cfm



Multi-Stage, Vertically Split
Pressures to 5500 psi
Capacities to 20,000 cfm



Intercooled 100-psi Units

These four basic casing types can be combined into multiple-unit installations to meet any pressure and capacity requirement. And every design features . . .

GREATER ADAPTABILITY to meet your specific needs. Seals, cooling methods and side-load connections are just a few of the many design details that can be "tailored" to each installation. What's more, every compressor is backed by . . .

MORE THOROUGH TESTING in the world's largest and best-equipped compressor test facility. Here new centrifugal designs, components, accessories and complete machines can be tested, frequently at full load and under simulated operating conditions.

5 MILLION HORSEPOWER of I-R centrifugal compressors are serving all types of applications throughout industry.

28SA12

Ingersoll-Rand
11 Broadway, New York 4, N. Y.

nual meeting, Statler-Hilton Hotel, Boston.

21-23 American Petroleum Institute, Division of Production, southwestern district meeting, Lincoln Hotel, Odessa, Tex.

26-29 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, joint annual meeting, Fairmont Hotel, Civic Auditorium, San Francisco.

27-29 American Society of Mechanical Engineers, power conference, Sherman Hotel, Chicago.

APRIL

2-4 National Petroleum Refiners Association, annual meeting, Granada Hotel, San Antonio.

3 Chemical Institute of Canada, chemical economics division conference, Royal York Hotel, Toronto.

4-6 API, Division of Production, Mid-Continent district meeting, Sheraton Oklahoma Hotel, Oklahoma City.

5-6 Society of Petroleum Engineers of AIME, upper Gulf Coast region, drilling and production practices conference, Beaumont, Tex.

9-10 Instrument Society of America, national chemical and petroleum instrumentation symposium, Wilmington, Del.

9-11 Mid-West Gas Association, annual meeting, Hotel Radisson, Minneapolis.

9-12 National Oil Fuel Institute, national oil heat and air conditioning exposition, Chicago.

11-12 Petroleum Industry Electrical Association and Petroleum Electric Supply Association, convention and exposition, Dallas.

11-13 API, Division of Production, Rocky Mountain district meeting, Hilton Hotel, Denver.

12-13 Society of Petroleum Engineers of AIME, production research symposium, Tulsa.

14-18 Petroleum Equipment Suppliers Association, annual meeting, Boca Raton Hotel, Boca Raton, Fla.

15-18 American Society of Mechanical Engineers, oil and gas power division conference, Shoreham Hotel, Washington.

17 Society of Plastics Engineers, Philadelphia section, regional technical conference, Sheraton Hotel, Philadelphia.

17-19 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

17-19 American Society for Metals, regional conference and exhibition, materials and materials processing for the petroleum, petrochemical and chemical industries, Shamrock-Hilton Hotel, Houston.

23-25 American Association of Petroleum Geologists, Rocky Mountain section annual meeting, Salt Lake City.

24-26 American Society of Mechanical Engineers, production engineering conference, Van Curler Hotel, Schenectady, N. Y.

25-27 Natural Gas Processors Association annual convention, Hilton Hotel, Denver.

29-May 1 Independent Petroleum Association of America, midyear meeting, Hotel Muehlebach, Kansas City.

29-May 1 Empire State Petroleum Association, spring convention, Statler-Hilton Hotel, Buffalo, N. Y.

29-May 2 Liquefied Petroleum Gas Association, annual convention and trade show, Conrad Hilton Hotel, Chicago.

30-May 2 Southern Gas Association, annual meeting, and American Gas Associa-

nine Dowell products to help operators solve

well cleanup problems

Dowell offers nine effective chemical products to help you solve well cleanup problems. Treatments using these products have boosted production, decreased lifting costs, improved injectivity, even brought in some wells.

BULK ACID—inhibited hydrochloric acid used to dissolve carbonate scale, limestone, and other materials.

INSTANT ACID— Dowell acid in granular form. Add water and it's ready to use. Convenient where transportation or storage of bulk acid is a problem.

VERSENE® 100 chelating agent used to remove difficult scale deposits, including calcium, magnesium and barium sulfate.

FREFLO* — Dowell mixture of oil-soluble, surface-active chemicals — used to prevent or break water blocks in wells.

DETERGER* water-soluble, surface-active agent used for well cleanup ahead of fracturing and acidizing treatments.

EZEFLO* low-pour-point, concentrated nonionic surfactant used in water injection wells to reduce pressures and increase water injection rates.

MUDBAN* — non-acid Dowell product — used to remove drilling mud from producing formations by penetrating and dispersing action.

FOAMING AGENTS—Dowell chemicals in liquid and stick form used to unload water or petroleum liquids from gas or oil wells.

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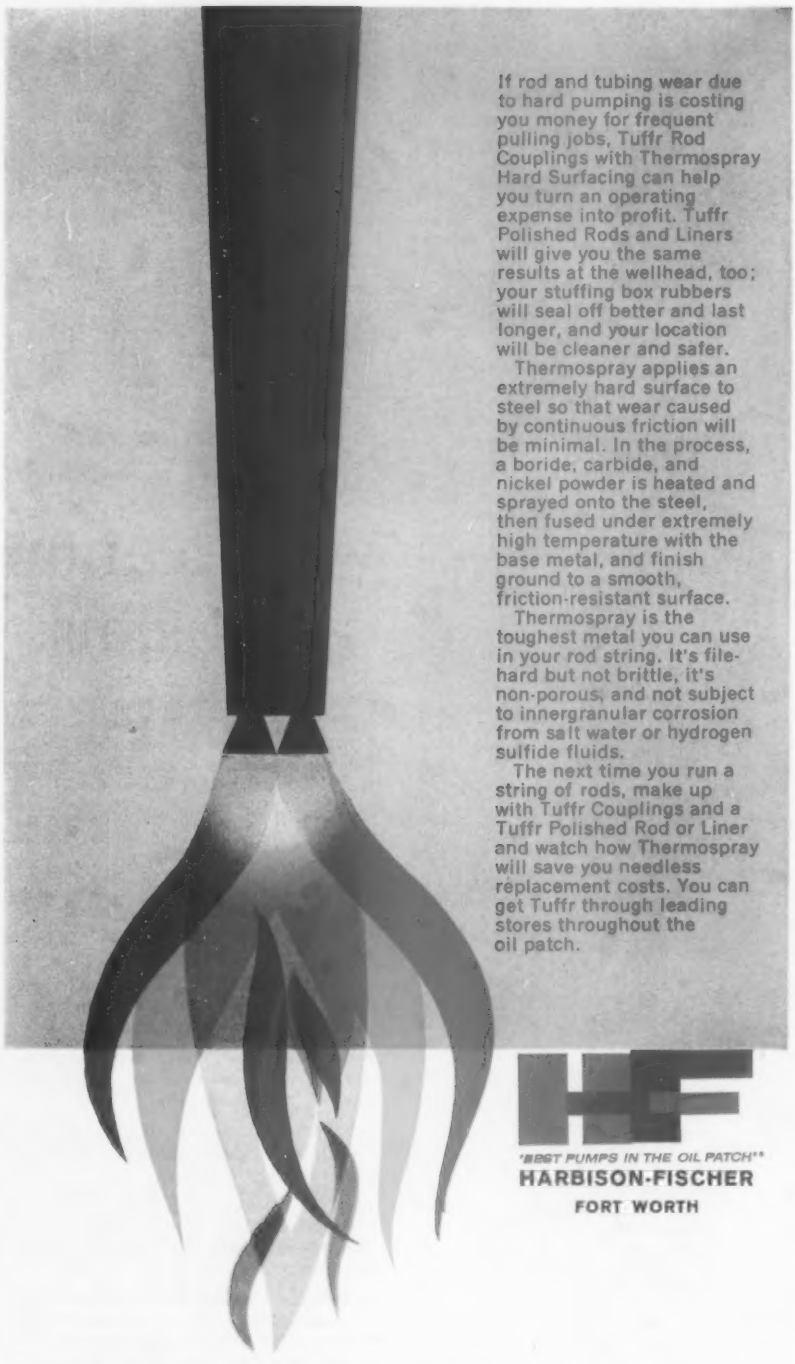

If rod and tubing wear due to hard pumping is costing you money for frequent pulling jobs, Tuffr Rod Couplings with Thermospray Hard Surfacing can help you turn an operating expense into profit. Tuffr Polished Rods and Liners will give you the same results at the wellhead, too; your stuffing box rubbers will seal off better and last longer, and your location will be cleaner and safer.

Thermospray applies an extremely hard surface to steel so that wear caused by continuous friction will be minimal. In the process, a boride, carbide, and nickel powder is heated and sprayed onto the steel, then fused under extremely high temperature with the base metal, and finish ground to a smooth, friction-resistant surface.

Thermospray is the toughest metal you can use in your rod string. It's file-hard but not brittle, it's non-porous, and not subject to innergranular corrosion from salt water or hydrogen sulfide fluids.

The next time you run a string of rods, make up with Tuffr Couplings and a Tuffr Polished Rod or Liner and watch how Thermospray will save you needless replacement costs. You can get Tuffr through leading stores throughout the oil patch.

"BEST PUMPS IN THE OIL PATCH"®
HARBISON-FISCHER
FORT WORTH

NEW from Harbison-Fischer

tuffr

POLISHED RODS
POLISHED ROD LINERS
SUCKER ROD COUPLINGS
with H-F
thermospray
HARD SURFACING

tion, transmission conference, Rice Hotel, Houston.

30-May 2 API, Division of Transportation, annual tanker conference, Del Monte Lodge, Pebble Beach, Calif.

MAY

2-4 API, Division of Finance and Accounting, midyear meeting, Americana Hotel, Bal Harbor, Fla.

4 Chemical Institute of Canada, rubber chemistry division, Niagara Falls, Ont.

7-8 Society of Petroleum Engineers of AIME, North Texas section, fifth biennial secondary recovery symposium, Wichita Falls, Tex.

7-8 American Society of Mechanical Engineers, maintenance and plant engineering conference, Royal Orleans Hotel, New Orleans.

10-11 API, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

11 Natural Gas Processors Association, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

11-12 Kansas Independent Oil and Gas Association, annual meeting, Broadview Hotel, Wichita.

14-17 API, Division of Refining, midyear meeting, Fairmont and Mark Hopkins hotels, San Francisco.

16-18 API, Division of Production, eastern district meeting, Deshler Hilton Hotel, Columbus, Ohio.

17-18 Society of Petroleum Engineers of AIME, production automation meeting, Hobbs, N. M.

20-23 American Institute of Chemical Engineers, national meeting, Lord Baltimore Hotel, Baltimore.

22-23 National Petroleum Refiners Association, computer conference, Hotel Tulsa, Tulsa.

22-25 API, Division of Marketing, midyear meeting, Queen Elizabeth Hotel, Montreal.

23-25 API, Division of Transportation, annual pipeline conference, Denver Hilton Hotel, Denver.

23-25 Eleventh National Telemetering Conference, Sheraton-Park Hotel, Washington.

24-25 AIME, Rocky Mountain petroleum sections, annual joint meeting, Billings, Mont.

27-30 Chemical Institute of Canada, Canadian chemical conference and exhibition, Macdonald Hotel, Edmonton.

JUNE

4-6 American Society of Mechanical Engineers, lubrication symposium, Deauville Hotel, Miami Beach.

10-15 American Society of Mechanical Engineers, summer annual meeting, Hotel Frontenac, Quebec.

13-14 National Petroleum Refiners Association, Mid-Continent regional meeting, Lassen Hotel, Wichita.

20-23 Canadian Gas Association, annual meeting, Manoir Richelieu, Murray Bay, Que.

24-29 American Society for Testing Materials, annual meeting and exhibit, Hotel Statler, New York.

25-26 Michigan Gas Association, annual meeting, Grand Hotel, Mackinac Island, Mich.

27-29 Automatic Control Conference, sponsored by Instrument Society of America, American Institute of Chemical Engineers, American Institute of Electrical Engineers, American Society of Mechanical Engineers, and Institute of Radio Engineers, New York University, New York.

Cuneiform Clay Tablet

A matter of interpretation...

THE ANCIENT TABLET CARRIES A MESSAGE. ■ INTERPRETATION BY AN EXPERT IS REQUIRED TO CONVERT THE WRITINGS TO USEFUL INFORMATION. ■ FOR THE INTERPRETATION OF ELECTRICAL LOGS, SCHLUMBERGER MAINTAINS A STAFF OF EXPERIENCED SPECIALISTS. ■ THESE EXPERTS ARE READILY AVAILABLE IN LOCAL OFFICES TO CONSULT WITH YOU ON MATTERS OF LOG INTERPRETATION.

SCHLUMBERGER LEADS IN LOGGING CONSULTATION

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F–A–S–T:

Frac — Acidize
Squeeze — Test

"FAST" — that's the name of the Johnston full-bore test and completion tool. With one trip in the hole: Recover formation fluid and pressure charts at any time; conduct an actual production test; take unlimited bottom hole shut-in pressures **without returning test section to surface;** squeeze, re-perforate and test all zones; acidize or frac with high fluid volumes.

The FAST Tool will save you round trips and costly rig time. Contact your Johnston Testers Man or write:

JOHNSTON TESTERS

A WORLD OF EXPERIENCE

HOUSTON, TEXAS
CALGARY, CANADA

THE JOURNAL SAID

50 years ago

November 2, 1911

After several months of inactivity following its discovery late in 1910, Electra field, in Wichita County, North Texas, has taken on new life. It now is the state's largest oil producer, making more than 7,000 bbl. daily from 27 wells. Production has passed that of Humble, largest producer of heavy oil on the Gulf Coast. Fort Worth and Denver Railroad has purchased 100 10,000-gal. tank cars to be used in moving Electra production to various refineries.

A correspondence school to teach the art of drilling and tool dressing by mail is being opened at Fresno, Calif. Sponsor is W. D. Echenbaugh, driller for W. K. Oil Co., who obtained a large part of his education through correspondence schools.

25 years ago

October 29, 1936

Crescent field, in Logan County, which boasts of having Oklahoma's biggest oil gushers, has a new record well, Continental Oil Co.'s 4 McConnell, with a potential of 53,640 bbl. daily. It flowed 8,947 bbl. of oil in 4 hours with gas at the rate of 74,750 M.c.f. daily. It is producing from total depth of 6,295 ft. in the second Wilcox.

A new oil-discovery well drilled by Olson Drilling Co. and Watchorn Oil & Gas Co. near the Morrison gas field in Clark County, southwestern Kansas, not only is giving the county its first oil production, but also is setting a new producing depth record for the state. The well, 1 Morrison, flowed 33 bbl. in less than 2 hours from Viola lime at 6,467 ft. Previous deepest production has been 4,650 ft. in the Shallow Water area of Scott County.

10 years ago

November 1, 1951

First production of oil or gas in the state of Washington is indicated in a well being drilled by Hawksworth and others at Ocean City, in Grays Harbor County. The well, 4 State, flowed at rates of 500 M.c.f. to 2 M.M.c.f.d. of gas in tests extending over a period of 8½ hours. Flow was from 126 ft. Miocene at 3,711 ft.

A deep wildcat test being drilled by George Vasen at 1 Tung in Stone County, southern Mississippi, has reached a depth of 20,450 ft., only a few feet short of the world's record depth of 20,521 ft. drilled by Superior Oil Co. in Sublette Country, Wyoming. Further drilling is being delayed by a fishing job to recover 200 ft. of dropped drill pipe.

JOURNALLY SPEAKING

What's in a name?

I'VE NEVER had much trouble with name confusion. Mine is not a common name, so when someone speaks to me I know to whom he is speaking.

Oh, one time during World War II I got a letter from a bird colonel who had the same last name, and he was trying to find out if there were any family ties. But we didn't come up with any genealogical connections. Too bad, maybe, as I was wearing a single gold bar at the time.

Other than the slight disadvantage (?) of not having a distant cousin among the top brass in the Air Force, I have been pretty happy with my lot. At least in a crowd, when someone yells "Hey, Smith, come over here!" I'm not part of the mob that starts moving.

And when I was in school, the teacher could think of some of the more common names first, and I missed out on having to answer some rather embarrassing questions, like "What is the answer to problem No. 4—uh,—Jones?"

So I had no name problems. At least not until I joined the Journal staff. Right away they made me production editor. That seemed to fit my pistol exactly because there was no other production editor on the staff, and again I had a name like nobody else—I thought.

But in this business you run into magazine people as well as oil people, and it takes a while to get to know who's who. During this breaking-in period I seemed to run into a lot of magazine people, and when I introduced myself I was faced with questions like "Oh, production, huh? What kind of presses you got anyway—flat bed or rotary? How many magazines do you print per man-hour shop time? How often do you need a work-and-turn? What kind of wire you using in your stapling machine?"

Having never heard of a flat-bed work-and-turn, I thought I had run into some kind of a nut or something, till it dawned on me that I was talking to a magazine man, and when I said "production" he thought I meant magazine production.

A quick glance at the Journal masthead showed me that, sure enough, there is another man on the staff with a title something like mine. He is Paul McBride, our production manager. He may not know a polished rod from a rat hole, but he knows how much ink and paper stock he has to have on hand for next week's issue, and he knows how to schedule the work on the big presses downstairs.

After I got that straightened out, all seemed rosy again until the day our vice president, Sie Rourke, brought this new man into my office. Seems there was a vacancy in the news room, and they hired this portly gentleman to fill the spot. He was a nice-looking chap, with hair a little lighter than gray, a 42-in. waist line, and a happy smile to go with it.

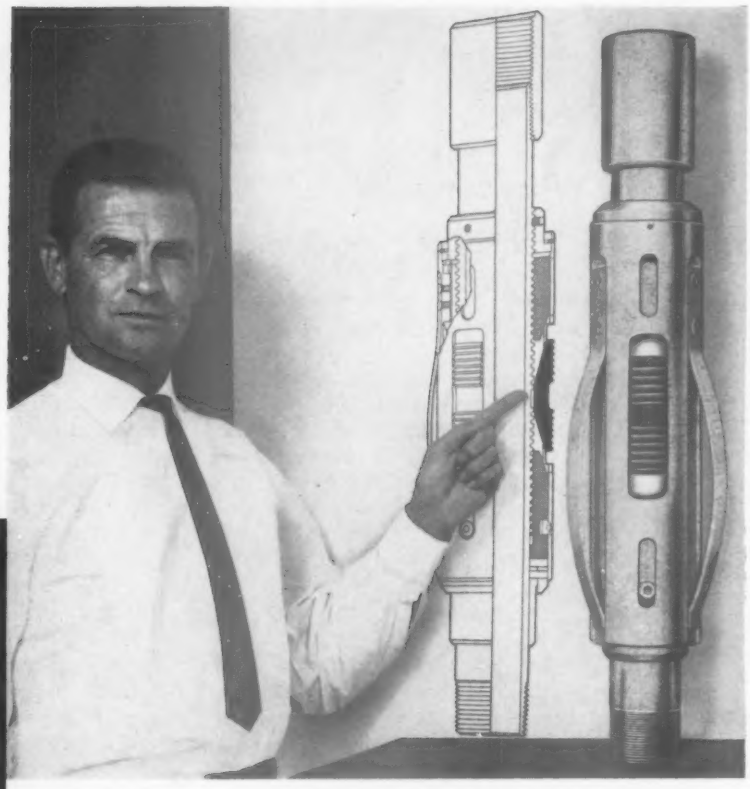
Sie said, "Mr. Bleakley, meet Mr. Blakely." Mr. B. and I looked at each other, then both looked at Sie, thinking he had lost all his marbles or something. Then we discovered that Sie was right, as usual, and this man's name was Blakely after all, and mine hadn't changed, so we were stuck with a situation that we both thought we had escaped—for life.

As it turned out, Merle Blakely has been a real good addition to our staff. Besides having a good nose for news, he is quite a photographer's model. And he is always on the go—looking for a scoop for the next issue of the Journal.

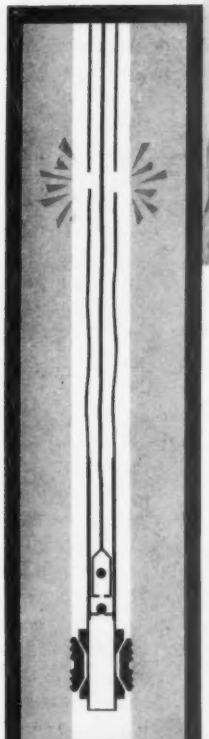
Well, we are one big happy family now. Merle reads my mail, I get his phone calls, the letter writers and the phone callers get confused, and we both give Leona, the switchboard operator, a lot of trouble, with those frequent requests to "Please transfer this call to the other Mr. B."

And through it all. Mr. B. and I are still friends—Leona, too.

—W. B. Bleakley



"This no-movement slip-cone design makes the Baker Anchor-Catcher different . . ."



Catches Tubing Before it Falls!
No free fall should the tubing part. Possibility of a coincident rod part is greatly reduced.

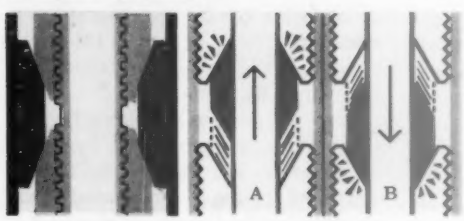
NEW BAKER TUBING ANCHOR-CATCHER COMPLETELY ELIMINATES VERTICAL MOVEMENT AT ANCHOR

Even deep wells can now be pumped more efficiently and with greater safety, because of Baker's "no movement" anchor-catcher principle.

Is no movement really important? It is . . . both in anchoring and catching tubing. This anchor-catcher stays exactly where you set it. Because it can't move downhole, it won't overstress tubing. Its positive, no-movement grip maintains the proper tension, once applied, to eliminate breathing and buckling . . . thereby reducing tubing and coupling wear and assuring maximum pumping efficiency.

The Baker Anchor-Catcher stays put—virtually catching parted tubing *before* it falls. The possibility of rod parts is greatly reduced and fishing jobs are simplified.

To learn more about the way in which this new Baker Anchor-Catcher (Product 698-B) can help you produce more oil at less cost, write for Bulletin 391. Baker Oil Tools, Inc., P.O. Box 2274, Terminal Annex, Los Angeles 54, California.



WITH A BAKER ANCHOR-CATCHER there is no movement after setting, because both cones are in full wedge-contact with the slips, which are in grip-contact with the casing.

CONVENTIONAL ANCHOR-CATCHER Insufficient tension may allow the cones to slam back and forth between the anchoring (A) and catching (B) positions during pumping cycle.

TUBING ANCHOR-CATCHER

BAKER OIL TOOLS, INC. HOUSTON | LOS ANGELES | NEW YORK

BAKER

What's wrong with marketing—No. 4

THINKING in the oil industry traditionally has started with exploration, concentrated on output, and ended with distribution. Marketing has been a stepchild—"for the birds."

Today, with a world surplus of crude, excess refining capacity, and supersaturated markets, the emphasis should be reversed.

If the industry is to remain profitable it must do more than just make oil available and laud its virtues. It must study the changing nature of its markets and understand the flow of products in distribution channels.

THIS IS A PRIME CONCERN for top executives of the larger companies, the men who set policies that swing the entire industry's practices. And having set sound policies they should police them.

There is much evidence that top executives do not know what is going on down the line in their own organizations. Many marketing subordinates act as though they were under orders to "get rid of the stuff" by fair means or foul and regardless of the consequences.

Majors are alarmed at the growth of independent marketers and the prevalence of price wars. But before jumping to conclusions they should ascertain the underlying causes. They may find that their own practices are largely to blame for today's marketing turmoil.

Runs of major refineries have increased more than those of small ones. So, much of the supply of independent marketers and price cutters must come from majors, directly or indirectly. Also, majors have taken away former bulk markets of small refiners, forcing them into direct distribution.

A fetish of the majors is that they never start price wars. But this word has not got down to local distributors who, if they don't fire the first gun, are quick to turn any little brush fire into a full-fledged war.

Many other things need examination. What constitutes the company's demand estimate in setting refinery runs. What happens to surplus gasoline dumped outside normal channels. How much product is sold at the incremental-barrel manufacturing cost and whether this causes price wars.

Top executives should know what their sales force is doing and saying, and the effects—other than on their own volume—of their own pricing methods, dealer treatment, station building, use of brokers and commercial accounts, and all other facets of their marketing policies and practices.

NEW THINKING IS NEEDED about where gasoline marketing is heading. Obsolete concepts must be junked, bad habits reformed, sloppy practices corrected. Marketing needs a reexamination from stem to stern.

Actions by big companies, however innocent their intent, which tend to eliminate a large segment of smaller marketers will bring serious political repercussions and possibly government regulation.

Executives should check their growth mania, volume obsession, and product orientation long enough to learn exactly what's happening in the market.

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850 BRANCHES IN CANADA, UNITED STATES, GREAT BRITAIN AND EUROPE
RESOURCES EXCEED $3,300,000,000

Forecast of military fuel needs

Thousand bbls. daily on fiscal year basis

	Actual deliveries			Planned procurement			
	1959	1960	1961	1962	1963	1964	1965
Avgas							
115/145	111	86	83	82	80	76	75
100/130	15	12	11	10	10	9	9
All other	4	3	2	2	2	2	2
total	130	101	96	94	92	87	86
Jet fuel							
JP-5	13	16	22	16	16	18	18
All other	314	307	320	324	344	357	358
total	327	323	342	340	360	375	376
Motor gasoline	45	45	47	46	49	50	50
Diesel fuel	50	52	58	61	60	61	62
Other distillate fuel oil	14	15	16	16	18	18	18
Navy special fuel	136	118	123	125	122	121	118
Other residual fuel oil	37	38	40	45	47	48	49
Grand total	739	692	722	727	748	760	759

Military fuel demand is going up again

Nation's new readiness program will increase needs. Largest increase predicted for jet fuel and Navy Special. Total purchases this fiscal year expected to be 40,000 bbl. daily above earlier forecast.

Clyde La Motte
Washington editor

THE OIL industry's biggest single customer—the military—is going to need more oil products in the years immediately ahead than had been expected only a year ago.

The upward revisions in current purchasing and in planned procurement are being caused by the step-up in the nation's readiness program.

It is not a spectacular increase, but it is a substantial one.

Current estimates of military requirements through 1965 are from 6 to more than 12% above estimates made last fall for the same years through 1964.

For example, last year at this time the military estimated it would need 677,000 bbl. daily of petroleum products during fiscal year 1964. The current estimate for that year is 760,000 bbl. daily, an increase of 83,000 bbl. daily.

The increased demand is apparent in actual purchases as well as in planned future procurements.

As late as last October the military expected purchases in fiscal year 1961 to average 670,000 bbl. daily. As it turned out, when the fiscal year ended June 30, the armed services had bought 722,000 bbl. daily—52,000 bbl. daily above the total anticipated.

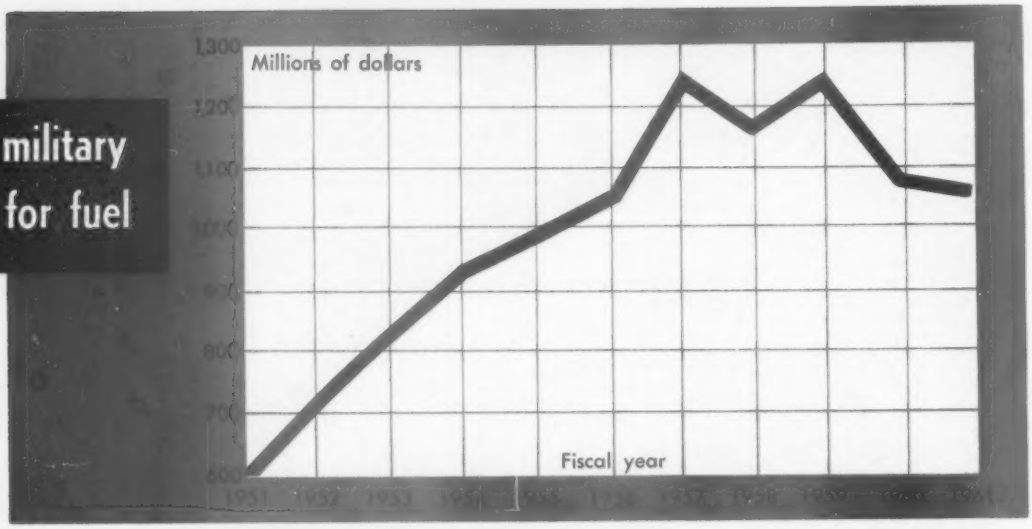
For the current fiscal year 1962, purchases are expected to run about 40,000 bbl. daily over what had been planned a year ago. For 1963, current estimates are now about 70,000 bbl. daily above last year's estimates.

Actually, estimates made in 1959 of requirements through 1964 were closer to current estimates than those made in 1960, when estimates were being trimmed. This year-to-year fluctuation in estimates is no reflection on the accuracy of demand forecasts by the military but, rather, an indication of constantly changing factors, including world situations and U. S. economic ups and downs.

One point the industry should note is that although the military is buying more petroleum, it has been spending less money.

For example, in the 1961 fiscal year the military purchased 279,-

What military spends for fuel



900,000 bbl. of products, compared to 266,200,000 bbl. the previous year. However, it spent $1,080,000,000 in 1961, compared to $1,093,000,000 in 1960.

This lower cost stemmed largely from the decline in avgas quantities and prices.

1. Product trends

As might be expected, the largest increases in military demand are for jet fuels and Navy Special.

This trend has been apparent for jet fuel for several years, but is given fresh emphasis in the upward revisions in requirements. For Navy Special, one reason for the increase is the stepped-up readiness program and the greater movement of troops and supplies.

Jet fuels alone account for 36,000 bbl. of the 83,000 bbl. daily increase in planned procurement of all products for 1964.

Navy Special estimates for 1964 are now 27,000 bbl. daily higher than estimates made a year ago.

Other residual and distillates are each up substantially over last year's estimates.

Avgas and motor gasolines, however, remain virtually unchanged.

2. Long-range trends

There are new developments—in the experimental stage or a step beyond—which may affect both the quantity and the type of military fuels in the years immediately ahead.

For instance, the Army's emphasis on mobility and mechanization will increase that service's fuels use substantially—probably by as much as 25% by 1970.

Aviation fuels will make up the greater part of that increase because of more Army aircraft and more use of jet fuel instead of avgas.

But ground requirements will increase, too, perhaps as much as 15% by 1970. One reason: The new mechanized Army division uses about 50% more fuel than the current infantry division.

Experts say the ground fuel increase would be even greater were it not for the trend to more efficient diesel engines in the larger combat vehicles, such as the M-60 tank. This tank gets almost twice as many miles per gallon as the gasoline-powered M-48.

Another possible trend is to multifuel engines which would run on either gasoline, CIE (compression ignition engine) fuel, or diesel fuel.

(CIE, the Army's newest fuel, is approximately the equivalent of JP-4 fuel except for cetane requirement which is not specified for JP-4.)

The Army is particularly interested in multifuel engine possibilities. One such engine, the LDS-427, has been released for production. First application will be on the M-35 2½-ton truck.

Most other combat diesel engines now under development will burn only CIE fuel and diesel, and are designed particularly for CIE because it is felt that this fuel probably would have relatively greater availability than conventional diesel fuel during wartime.

These additional engines will be developed and initial tests begun in from 1 to 3 years, the Army reports. The current plan is to use them in all combat and tactical vehicles having high horsepower requirements. No estimate has been made as to the time that will be required for a changeover to these engines.

3. Spec changes

While there are no revolutionary specification changes in sight, these alterations are under way or in prospect:

Avgas standardization to reduce the number of grades required is being emphasized. It is expected that by mid-1962 only one grade of avgas (Grade 115/145) will be used to meet overseas requirements. The economic feasibility of reducing the number of grades used in the U. S. is also being investigated.

Lubricating oil studies are under way aimed at standardizing one grade for piston-engine aircraft use by all services. The Air Force is currently testing an ashless dispersant type which has already been adopted by the Navy (MIL-L-22851[Wep] 30 June 61). Also, specifications for synthetic jet-engine lube (MIL-L-7808) are being revised to improve the quality and to lengthen the period between engine overhauls.

Revisions are being made, too, in specifications for lubricating oil used by B-70's (MIL-L-9236B) to improve quality including improved performance at high temperatures.

Hydraulic fluid specification

(MIL-L-5606) is being revised to improve product cleanliness.

Anti-icing additives for jet fuels are getting increased attention. The Air Force feels that a definite research breakthrough has been scored in this field and that the new additive developed may be adopted by all the services. A study is in progress to determine whether the additive should be blended at the refinery or subsequently in the military supply system.

Thermally stable fluids, needed for hypersonic flights, are receiving continuing emphasis. What the Air Force wants is a liquid fuel with stability at temperatures ranging up to 800° F.

It reports that several such fluids have been made which would probably meet the physical and chemical requirements for hypersonic flight. However, the projected price structure—from 75 cents to $1.50 a gallon—is high and the availability of the materials is poor at this point.

Navy Special upgrading is also a possibility in the years ahead, with a trend toward lighter, cleaner boiler fuel to cut down maintenance costs.

REAR ADM. T. L. BECKNELL, JR., took office this year as executive director of the military's billion - dollar - a - year buyer of petroleum, the Military Petroleum Supply Agency. He succeeded Rear Adm. O. P. Lattu.

4. Supply storage

The step-up in military readiness and in troop movements is putting fresh pressure on the need for facilities to transport larger quantities of supplies more quickly and to provide more storage facilities at key points.

Much of this program was already under way, however, before the current crisis developed and the current world situation has had no appreciable effect on the program to secure pipeline service to high consumption bases. The Air Force, for instance, has now provided 30 bases with facilities to receive avgas shipments by pipeline. This is an increase of 9 over last year.

Pipeline facilities are currently under construction by the industry at four other bases, with completion scheduled soon. Arrangements have been made for connections to 3 other bases, and the industry is currently studying the economic feasibility of pipeline connections to 10 additional bases.

The Army, convinced that it must improve its overland petroleum distribution system, has decided that this could best be done by use of high pressure welded pipelines instead of a coupled pipeline system.

The missing key to the Army's utilization of a welded pipeline system, however, is an automatic welding machine having the mobility that would be necessary under combat conditions. The Army's developmental agency is currently accelerating its research and engineering efforts to produce such a welder.

Even if a suitable welder is developed, Army officials say, there still will be a need for small-diameter coupled pipelines in forward combat areas and for use as branch lines to air bases.

Regarding storage, a special program is under way to secure long-term storage services for the Air Force to feed the big appetites of the modern jet planes.

Hardened (buried) facilities for 360,000 bbl. of storage have been completed for supplying Pease AFB in New Hampshire, and work is under way on 400,000 bbl. of "dispersed" storage at Wurstsmith AFB in Michigan.

For the Navy, a long-term contract was awarded this year for construction and operation of 270,000 bbl. of storage for Navy Special fuel oil at Subic Bay, in the Philippines, to meet Seventh Fleet operational requirements.

The military is also making increased use of collapsible tanks of various sizes to provide operational storage at advanced bases where construction of conventional facilities is not practicable. Collapsible tanks are also being used on dry-cargo vessels to move petroleum products.

The Navy is continuing experiments with collapsible containers for underwater fuel storage. A 50,000-gal. rubberized container was tested in the Gulf of Mexico last year and it worked satisfactorily. However, since the operational utility of such a system depends largely on the ease with which it may be anchored to the ocean floor, there still remains the problem of a suitable anchoring device.

The Navy has also expressed interest in submersible steel tanks similar to offshore facilities used by the industry. The use of such tanks would largely eliminate the anchoring problem with the rubberized containers.

5. Procurement

The past year has seen some significant progress in the military's method of processing bids.

In January of this year the Military Petroleum Supply Agency used for the first time a large digital computer to assist military buyers in evaluating jet fuel bids and in determining contract awards. The mechanical system combines Army, Navy, and Air Force requirements, bid information and transportation rates and computes a least-cost distribution pattern.

Other reports are produced to help the buyers in small business negotiations and further bid analysis.

Having passed its tests, the computer approach is now getting expanded use. It will be applied to all major jet fuel procurements and later this year it will be extended to aviation gasoline. In another year, perhaps, it will also be used in lubricating oil procurements.

MPSA also plans to investigate application of the existing system, or a modified version, to such areas as tanker distribution, dispersion of terminals and other emergency or research situations.

Gas exploration coming into its own

Phillips geologist tells AAPG group that gas no longer can be considered a mere by-product of oil hunting. Some companies now separate their oil and gas exploration budgets. Results show this approach is sound.

Frank Gardner
Exploration editor

THERE was a day when a wildcatter hadn't the slightest idea, when he punched a hole in the ground, whether he'd find oil or gas.

Today, thanks to experience and know-how, several companies are deliberately searching for gas as such, to the exclusion of oil. They're budgeting so much toward gas exploration, so much toward oil, and predicting in advance just which prospects will yield which product. And the predictions are proving about 94% accurate.

Result: No longer can gas be called a "by-product" discovered accidentally in the search for oil.

For gas is the No. 1 target in this country today. And it had better be, if we are to keep a decent reserves-to-production ratio. That ratio has reached its economic minimum of 20-1.

These developments were brought to the attention of 700 geologists meeting in Amarillo, Tex., last week. C. M. Allen, staff geologist for gas, Phillips Petroleum Co. told the Midcontinent Regional Meeting of the AAPG of his company's experiences in a budgeted gas hunt over the past 2 years.

"As far as Phillips is concerned, the search for oil and the search for gas have been divided since January 1, 1959, and all our direct exploratory expenditures are assigned, prior to making the expenditure, directly to the search for gas or to the search for oil, depending upon the primary objective," Allen said.

Direct exploratory expenditures include geophysical and geological exploration, leasing costs, delay rentals, and all exploratory drilling.

As of the first of 1959, Phillips' management directed that the Land and Geological Department, in authorizing or in recommending each direct exploratory expenditure, should analyze beforehand and state on its requisition for funds just what the objective was—gas or oil.

"Phillips recognizes," Allen said, "that the validity of this approach must be tested against the results. Of course, many exploratory expenditures result in finding no production and no check of results is possible, while the results of other expenditures may not be determined for several years. However, there are a fairly large number of positive results for which checks can be and have been made."

How has it worked? The approach has worked extremely well, according to Allen's figures.

"Over the 2-year period, 1959 and 1960, Phillips has made lease purchases on 74 prospects which are now producing. Our predictions on 71 of these proved to be correct. Of course, we purchased leases on a good many prospects which are not producing.

"During the 2-year period, we made expenditures for geographical or geological exploration on 33 prospects which are now producing. Of these, our predictions proved correct in 31 of the cases. Over this same time, we drilled or promoted 123 productive exploratory wells. Our predictions on 112 of those wells were correct."

The check of predictions against results proves that direct assignments of exploration expenditures can be made, Allen contended. "It also follows that management is given a very valuable tool, in that it can direct its exploratory program toward either oil or gas, depending upon the incentive offered by the two products."

Although his company has been operating on a somewhat smaller exploration budget in recent years, Allen pointed out that 75% of that budget has been aimed at gas since January 1, 1959.

"I cannot say what other com-

TIPRO proposes bidding system

TEXAS independents last week stepped up the clamor for basic changes in the import-control program.

The Texas Independent Producers and Royalty Owners Association urged Interior Department to adopt a new program which would junk historical and refinery-run bases for awarding import quotas.

And the West Central Texas Oil and Gas Association came out swinging with a strong resolution condemning the current program as one which is helping to wreck the domestic industry instead of saving it.

The new TIPRO plan would limit imports of crude, unfinished oils, and non-residual products from all sources to 11% of domestic crude production. Resid imports would be permitted, as at present, to supply the gap between domestic supply and domestic demand up to 11% of domestic crude production.

Import licenses would be awarded via competitive bidding only to those companies which would certify their intention and capability to import the oil and arrange for sufficient capacity and marketing outlets to accommodate it.

Five-count indictment. The conservative West Central Texas producer group served notice that it is "fed up" with the current program.

The board of directors, meeting after the close of the association's October 19 annual meeting, declared that:

Domestic oil production has stagnated since 1954 "while the ratio of imported oil to domestic production has increased above the established 'safe' level of 16.4% to above 25% during the same period.

panies were searching for," he said, "but I can point to a trend in the results of the search to show what industry as a whole was actually finding. Although the total number of exploratory wells is declining, the per cent of productive exploratory wells completed as gas producers is increasing while the per cent completed as oil producers is declining."

Allen presented statistics showing that this decline in oil discovery wells was from 80% in 1956 to 60% in 1960. The increase in gas discoveries was from 20 to 40%.

This same situation applies to drilled footage also.

"We find that the exploratory gas footage has increased from about 23 to 44% of the productive footage, while oil footage has declined from about 77 to 56%," Allen said.

"I want to say again," the speaker concluded, "that exploration will have to be focused on gas if we are to meet estimated future demand for gas in the United States. It seems to me that the Federal Power Commission must be made aware of these facts. To take the risks and make the expenditures for exploration, the producer must have an incentive. I know of no better incentive than an adequate wellhead price for natural gas."

for import quotas

Nothing has been done "to secure a pipeline from West Texas (an area with excess productive capacity) to the West Coast (which contains numerous industries vital to our security and is a net importer of exempt foreign production)."

Canada is continuing to import "several thousands of barrels of oil daily from overseas into its eastern industrial and consuming area. And at the same time is increasing its exempt imports into the U. S. from western Canada."

Domestic prices have dropped in the past 2 years while imports have continued to increase.

Managements of refining and importing companies, "in an effort to maintain their shares of both the products market and imports have been enticed to keep refinery runs at dangerously high levels," the association said.

WATCHING WASHINGTON

with Clyde La Motte

Military will be seeking more help from oil industry

JUST AS the military's oil procurement is on the rise (see p. 99), so is the military's oil planning. In fact, unless and until there is a shooting war, the planning will have much more momentum than procurement.

The industry will be directly involved in this stepped-up activity because it will be called on with increasing frequency to supply information to the military.

During World War II and the Korean fight, close cooperation developed between the two. In recent years, however, the machinery for such efforts has been allowed to deteriorate, partially because the need decreased temporarily and partially because many in the industry became wary of the Justice Department's insistence on elaborate antitrust safeguards.

The ill-advised "conspiracy" suit against 29 oil companies after the Suez crisis didn't help matters, either.

But the picture is now undergoing considerable change. In the touchy world situation, the military finds it necessary to plan for all eventualities. To do this, it needs to know what facilities exist, where they are, and the shape they are in. It needs to know what products could be made available in what quantities under various conditions.

The industry, too, needs to have some understanding of what the military has in mind if it is to plan quick adjustments in refining, transportation and storage patterns to meet rapidly changing emergency situations.

Roadblocks to industry cooperation are being removed

TO HELP it with its essential planning, the military wants the assistance of experts from the oil industry.

Vice Admiral Burton B. Biggs, director of petroleum logistics for the Department of Defense, has campaigned vigorously to clear the way for a return to efficient military-industry cooperation.

The stage is now being set for that development. One such move currently is the formation of a special subcommittee of industry experts to work under government supervision to provide up-to-date world-wide oil data to the military.

In addition, Interior Department's Office of Oil and Gas will be strengthened to help it make special studies. And it is quite likely that the National Petroleum Council will be asked to do many more studies than in the recent past.

It appears inevitable, therefore, that virtually every industry segment and many individual oil companies will be called on with increasing frequency to provide men to help with this work.

There is little reason to hope that this will be a temporary situation, either, considering the state of world affairs.

White House letter to Judge Savage: Goodbye, Sir

OLD-TIMERS around Washington could not recall when the White House had ever accepted a resignation of a government official with the icy formality of President Kennedy's two-sentence letter to Judge Royce Savage, who resigned to become general counsel for Gulf Oil Corp.

There was not even the customary expression of appreciation for "years of fine service." Instead, the President's letter simply said that the resignation had been received and accepted.

Swidler says FPC's goal is smoother,

THE Federal Power Commission will put new emphasis on efforts to settle pending cases without going all the way through formal proceedings, Chairman Joseph C. Swidler revealed last week.

This is one of several moves the commission is considering with the aim of clarifying and simplifying procedures to help trim the backlog of cases, Swidler said in a tape-recorded interview with the Journal Washington editor, Clyde La Motte.

Other highlights included:

An announcement that the commission hopes to outline soon some specific steps that would simplify the southern Louisiana area-rate proceedings.

An indication that hearings for other areas will be delayed until a pattern emerges from the present ones on Permian basin and southern Louisiana.

Confirmation that the commission is now virtually convinced that it does not have the legal authority to exempt small producers.

A conclusion that interstate pipeline companies have little prospect of being permitted to "pay" themselves the same price for their own production as they pay other suppliers in a given area.

An expectation that the staff will soon complete preparation of a new rule on evidence. This would spell out what information will be required from a company in order to comply with the commission's plan to have more complete evidence submitted at the time a case is filed.

An explanation of the type of long-range economic studies Swidler expects to be made by the new Office of Economics, and how this may help speed area-rate proceedings.

An intention to emphasize streamlining of staff field investigations, including elimination of time-consuming nit-picking.

A promise to improve lines of communication between the commission and its staff and between the commission and the industry.

Here is the interview:

1. Exemption prospect

Mr. Swidler, last month in Houston you outlined some of your thinking on natural-gas regulatory issues. Have you formed any new opinions or revised previous ones since that time?

One thing on which I would have some question now would be some of the figures I used there. After talking with our own geologists and with outside geologists, I think the figures I cited as to total recoverable gas were on the high side.

Also, on the problem of the treatment of small producers, I indicated my interest in their possible exemption. But I find there are more serious problems in the way of such special treatment.

Commissioner Howard Morgan, speaking in Abilene, Tex., recently, pointed out the biggest of these problems: The question whether the commission may legally make exceptions based solely on size.

Does that mean, then, that the prospect of exemption of small producers appears remote?

So far as outright exemption is concerned, it is. But the commission will continue to try to make whatever adjustments in its requirements it possibly can in recognition of the fact that many small producers simply do not have the data, facilities and manpower necessary to provide all the record-keeping the commission requires of the larger producers.

Mr. Swidler, in your Houston speech you outlined some basic steps you hoped the commission would soon be able to take to reduce the pile-up of cases. Have there been any further developments?

Yes, several of them. For one, we hope to be able to announce soon some steps that would simplify southern Louisiana area-rate proceedings.

For another, I think the commission will also put greater emphasis on settlements, rather than letting each case drag to its bitter end.

The reason for this emphasis is that we would like to make a practical disposition of as many of the cases in our backlog as is possible. We would do this without attempting to vindicate fixed positions in proceedings or in litigation, but rather to try to arrive at practical answers that would be agreeable to all parties concerned, including the intervenors.

You have said that the commission hopes to make use of policy statements to serve as guidelines. Do you envision one or two major statements aimed at covering a wide range of problems, or a series of statements, each aimed at a particular issue?

It is more likely to be a series of statements on specific points.

For instance, we have just issued one such statement, notifying the industry that henceforth we will grant temporary authority for major natural-gas pipeline construction only after a notice of application has been issued and a hearing on the proposal held.

We will issue other statements as soon as possible on other policy changes and clarifications.

2. Area-price hearings

Area-pricing apparently is getting the commission's principal attention these days. Will there be other area-price hearings set up soon or will you wait for the Permian basin and southern Louisiana area proceedings to provide a pattern?

I think we will wait to set up additional rate proceedings until we have straightened out procedures of the ones now under way.

When we have a more definite notion as to how these proceedings should be carried on, we will be able to initiate additional proceedings without the waste of time, the lost motion, that would result if we were to launch new proceedings before we had worked our way to clear ground.

What happens meanwhile to cases that are pending in other areas?

faster action

Until we set up new area-rate proceedings covering those areas, we will have to handle those individual cases as best we can with our available manpower.

Hopefully, many of these cases can be settled in a way that will be acceptable to all parties. Some of the others undoubtedly will have to be tried.

What consideration is being given to revision of present area boundaries?

This is a problem we should have mastered by now, but I am frank to say that we haven't advanced our thinking on this since I spoke in Houston.

Mr. Chairman, is the commission staff working on any particular data, such as cost trends and other industry-wide material that might be used in specific area-rate determinations?

You may have seen the recent announcement that the commission has established a new Office of Economics.

We have had economists on our staff in the past, of course, but they have been attached to the other offices and have not done the long-range economic work that the commission really needs.

We are now in the process of staffing this new office. We have been delayed by difficulty in getting from the Civil Service Commission an allocation of new supergrades we need in order to obtain key people. But we are hopeful our request will be approved soon.

When the office is functioning, we will expect it to make the necessary long-range studies.

If such studies, together with information developed at the initial area-rate hearings, tend to provide an over-all picture, will succeeding area-price hearings be primarily to show only how they differ from the norm, rather than going through the entire presentation of all evidence?

I assume that much of the material of these initial proceedings will cover data that will be applicable in other areas.

We hope that such material could be stipulated into the record without preparing material which simply duplicates something which has already been done.

However, even though a good many questions could be handled in that way, there would probably be enough differences between area situations and the time factors involved so that numerous questions covered in earlier proceedings would have to be covered again in later ones. But I would hope this could be kept to a minimum.

3. In-place purchases

You have been quoted as saying that in-place purchases by pipeline companies should be subject to regulation. How would such regulation be handled?

I was referring to in-place purchases by pipeline companies under the commission's jurisdiction under contracts which are equivalent in substance to purchases at the wellhead.

If the commission does have jurisdiction over those transactions despite the difference in form, then I would think that area prices might well apply. But I don't want to jump to that conclusion just yet for there may be good reason for different treatment.

FPC CHAIRMAN Joseph C. Swidler, right, gives his views on some vital industry issues in an interview with the Journal's Clyde La Motte.

I cannot recall that you have ever expressed an opinion as to whether an interstate pipeline company should be entitled, for rate-base purposes, to the same price for its own production as the price it is paying for similar gas in the same area.

This is one of the more difficult policy questions confronting the commission.

Historically, the commission has held to the line that the production properties of a pipeline company under its jurisdiction are no different from the investment, say, in a pipeline's compressor stations.

This is a deeply embedded policy which I am sure the present commission would not want to disturb unless there were compelling reasons to do so.

In Houston you spoke of several steps you had in mind which might help the commission get rate cases settled more expeditiously. Please spell out some of these possibilities.

Keeping track of the status of these cases is one key to keeping them on schedule.

Setting up a schedule in the first place so you can tell when a case has fallen behind at any step of the proceedings is another effort in the same direction.

Trying to clean up the backlog by settlements so that additional manpower would be available for remaining cases is a third move toward becoming current.

I might say that every step in the processing of our cases is being analyzed with the view to setting up some sort of norm of time for the handling of these steps so that they can be processed within the statutory period.

But I don't want to give you the impression that the day is just around the corner when we would be

handling all or even most of our cases within the suspension period.

You announced previously that the commission plans to require that cases be more fully prepared at the time a filing is made. Is the commission going to spell out what it expects in these filings?

Yes. The staff is working on a regulation which would have that purpose.

Do you foresee possibilities of speeding up case handling by streamlining staff field investigations?

Yes, I do. We are going to make an all-out effort to limit field investigations to items of significance. We will try to avoid fly-specking in our handling of field audits.

You and the other commissioners have stressed the need for industry cooperation, and you have cited the need for pooling of information whenever feasible to help speed area-rate case handling. Do you consider the recent joint producer presentation at the opening of the Permian basin hearing a good example?

The reports I have received have been very good. There seems to have been a high degree of cooperation among the producers, and the testimony appears to have been on a high level.

There have been times in the past when it seemed that the commission was going in one direction while the staff was headed in the opposite direction. How do you size up this problem?

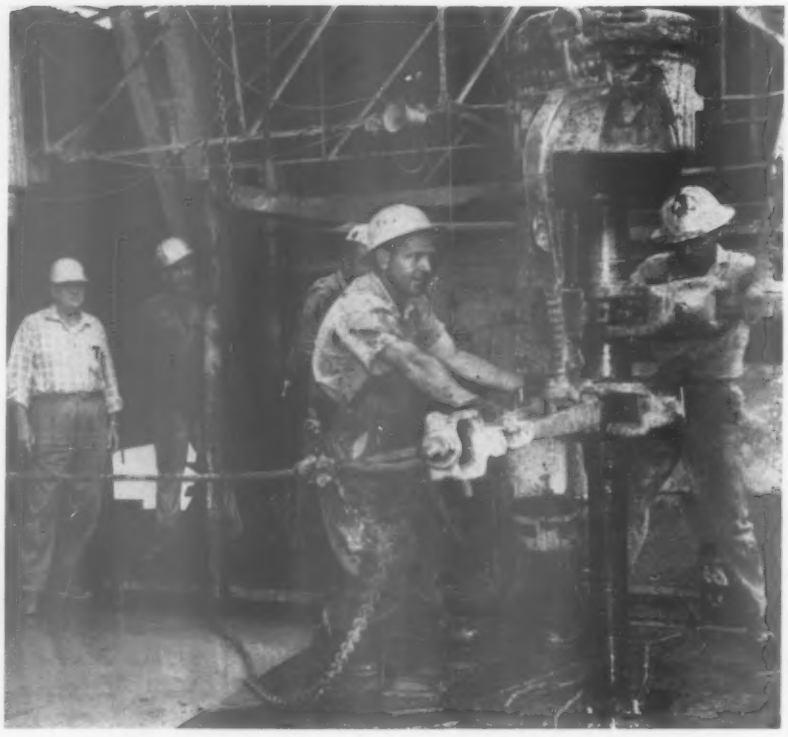
I don't think I would put our problems in that context. The real problem is one of communication.

How about improved communications with the industry?

We will certainly do our level best to keep open the channels of communication.

We are trying to do that in many ways. One illustration is my talk right now with you. I welcome opportunities to cooperate with the publications which serve as an important channel of communication.

I also welcome any opportunity to talk with leaders of the industry when they are in Washington or when I have a chance to meet them on their home grounds.



FAST WELD is made by crew on Gulf well in South Texas.

Gulf extends fast drilling

GULF Oil Corp. is extending its speed-drilling technique from the easier formations of South Louisiana to the harder rocks of the lower Texas Gulf Coast.

While not approaching the mile-a-day pace of last summer in Louisiana (OGJ, April 24, p. 67), Gulf nonetheless was drilling last week at record rates in the Laguna Madre area of Cameron County, Texas. Average time in the area has been 8,000 ft. in 18.4 days. Gulf reached that depth in its State Tract 729 No. 1 in just 8 days.

Rig 17 of Brewster-Bartle Drilling Co., the contractor, made 8,823 ft.—the logging depth—in 9 days, 19 hours. This compares with the previous record of 8,900 ft. in 20 days.

Photo shows Brewster-Bartle crew at work.

Gulf attributes its speed to a number of factors, none of which represents a revolution in drilling. The company makes use of known techniques.

It says the money-saving speed is due to the use of (1) clear water as a drilling fluid to great depth, (2) higher pump pressures and higher fluid velocities at the bit, (3) heavier bit weights, and (4) higher rotary speeds.

In the Laguna Madre area, bay water was used as the drilling fluid from 988 ft. (surface casing depth) to 5,084 ft. Diesel oil was added to 6,902 ft. Below that, Bentonite with small amounts of chemical was used.

The maximum bit-weight run was 55,000 lb. and maximum rotary speed was 300 r.p.m., compared with an average of 30,000 lb. and 100-125 r.p.m. for the area.

The driller also used a longer tooth bit than usual.

Gulf is convinced it can easily eclipse its performance on the latest well. In South Louisiana, experience in cutting downtime enabled the company to set a string of drilling speed records.

In fact, Gulf was on the threshold of setting a new record in September in Laguna Madre when Hurricane Carla interfered. The well was a discovery in the area. The latest well, a tight hole, is a 1-mile offset wildcat.

Gas producers may have better market soon

IT'S a buyer's market today for natural gas in the field, but look out for tomorrow!

That is the gas-pipeline outlook as described by H. F. Steen, vice president and operations manager for El Paso Natural Gas Co.

Steen spoke as one member of a three-man panel probing gas problems during the twenty-eighth annual meeting of the West Central Texas Oil and Gas Association in Abilene, Tex.

For the first time in many years, Steen said, "El Paso Natural and most other pipelines are being pressed by producers to buy their gas. The great surpluses experienced in 1946 through 1949 have not returned, but there now are at least reserves available for purchase."

Many in the industry, Steen said, believe this buyer's market will continue for several years, but growing demand for gas and declining deliverabilities will reverse the situation. And this means, he declared, that exploration and drilling must be stepped up heavily over current rates if the industry is to meet the demand.

The gas paradox. The current gas availability and the producer difficulties in marketing it are surprising to some, Steen said, especially when you consider that gas consumption continues to set new records.

Adding to the confusion, he said, are figures which show that the U. S. last year had only a 20.3-year supply of gas at the 1960 rate of consumption, compared to reserve-life indices of 32.6 years in 1940 and 32.5 years in 1946.

The explanation, he said, is that pipelines generally are now looking for reserves which will be available in 5, or 8, or 10 years, rather than for large quantities for immediate market delivery.

This, of course, is hard on the producer, Steen said.

"The producer needs income from his gas promptly after its discovery. To leave a well or a group of wells shut in for a long period of time seriously hampers and sometimes is ruinous to the payout of such wells. Interest expense alone can wipe out profits.

"Therefore, the producer must find an early market. Economically, he cannot wait 3, 5, or 8 years for a pipeline company to commence payment for his gas."

Steen's companions on the panel were Howard Morgan, assistant chairman of the Federal Power Commission, and Carl Hill, vice president of Lone Star Gas Co., Dallas. Bill Tindell, chairman of the association's gas committee, was the moderator.

Texas project killed. In an introductory statement, Tindell struck out strongly at FPC policy statements which would set up quality standards for pipeline gas and limit deliveries to a proportion of reserves.

It credited the mere issuance of these policy statements, though they have not yet been actuated as regulatory requirements, as having "dealt a final blow" to efforts of gas producers in the West Central Texas area to attract a major new interstate market.

The association, he said, objects violently to FPC adoption of such policies and urges their withdrawal. Otherwise, he indicated, large gas reserves in West Central Texas could never be developed.

Tindell struck hard, too, at a practice "by some pipelines" whereby they pay higher per-foot prices for the larger gas packages. If these purchasers do not meet their responsibilities for equitable treatment of producers, he warned, it "can only lead to wider-spread cooperative effort by the producer pressing for legislative and judicial equity."

Industry Briefs

First test in Canadian Arctic was drilling below 5,750 ft. last week and no big problems had been encountered. The well, Dome Petroleum et al. Winter Harbor 1, is being drilled on Melville Island, 1,600 miles north of Calgary. Target depth is at least 10,000 ft.

A new natural-gas tax has been levied by the Arkansas Oil and Gas Commission. The one-half mill tax on each 1,000 cu. ft. of gas produced in the state will be used to help pay the commission's operating expenses.

November crude output in Louisiana, New Mexico, and Oklahoma will be virtually the same as in October. Oklahoma ordered 13 producing days for the 6th straight month. New Mexico held its allowables to 34 bbl. daily in southeastern fields and 70 bbl. daily in the San Juan basin. Louisiana set its daily allowable at 1,027,235 bbl., an increase of 14,000 bbl. to take care of new production.

Consolidation of its Canadian interests is planned by Murphy Corp. Directors of Amurex Oil Co., Calgary, and Murphy-Canada Oil Co. have approved merger of the two firms, and stockholders will vote December 11. Murphy Corp. owns more than 80% of Amurex' outstanding capital stock and all of Murphy-Canada. The new firm will be Murphy Oil Co. Ltd. and will be involved in exploration, production, and marketing.

Majority interest in Buckley and Scott, Boston, furnace oil distributor, has been acquired by Atlantic Refining Co. M. G. Davis, general manager of domestic marketing for Atlantic, will become chairman of the firm, which will continue to operate with present management.

An antipollution order issued by the Texas Railroad Commission directs operators in the Reagan County portion of Spraberry Trend area field, West Texas. to line all saltwater disposal pits with impervious material by Sept. 27, 1962.

Higher trucking rates for hauling oil field equipment are being considered in Texas. The Oilfield Haulers Association asked the Texas Railroad Commission to approve a 6.5% rate increase. The move was strongly opposed at an October 20 hearing by the American Association of Oilwell Drilling Contractors.

Subsea wells offset California field

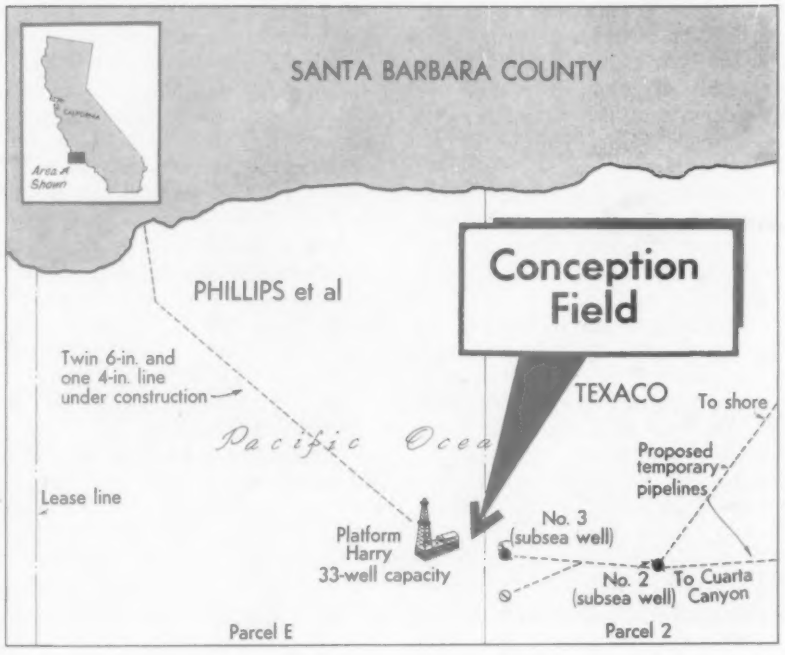
Phillips, Texaco work on neighboring leases in unusual play.

A NEW oil field is about to go on production off California—and an interesting drilling play has developed as a sidelight to bringing the field on stream.

Phillips Petroleum Co., operator in Conception field for a group of companies and individuals, is running production tests on eight wells completed in the field. The company will put the wells on production early next year when twin 6-in. lines and a 4-in. line to onshore storage are completed.

While Phillips is drilling additional wells and running production tests from a drilling platform, Texaco Inc. is busy on an adjoining lease, drilling what amounts to offset wells as ocean-floor completions. Texaco paid a bonus of $9.5 million for its lease recently. The Pauley group got its lease in 1958 for $5.1 million.

Two Texaco locations are within 350 ft. of the lease line. No information has been released on Texaco's No. 3 Conception well, but there is a little doubt it is a producer. The surface location is only 1,300 ft. east of Harry, a 33-well platform on the Phillips lease.



Texaco is drilling a second offset, No. 4, south of its No. 3. The No. 4 location is about 1,800 ft. southeast of the Phillips platform.

The bottom-hole locations of the wells are even closer than the surface locations, since some of the Phillips wells are whipstocked toward the lease line from Harry.

In completing the wells on the ocean floor, Texaco encases the wellheads in a protective cover before shutting them in. Texaco has drilled two wells on its lease, the No. 3 and the No. 2. The latter is a redrill near the property's center.

None of the Texaco wells is on production, but the company has filed plans for a temporary pipeline which may terminate either onshore or at facilities 5¼ miles to the east at Cuarta Canyon field, where Texaco is drilling from a 28-well platform.

New gas find made in federal waters off Texas

SHELL Oil Co. has made another gas discovery in Block 160 in offshore Texas. But both the new find and the first discovery, 2,100 ft. to the east, are still a long way from giving Texas its first commercial field in federal waters.

The new well, 40 miles southeast of Galveston, is just a bit better than the marginal producer brought in last summer (OGJ, July 10, p. 69).

It has an open flow potential of approximately 60 million cubic feet of dry gas, compared with 43.5 million for the first discovery. The production test on the new well showed 4,700,000 cu. ft. through a ¼-in. choke with flowing tubing pressure of 3,235 psi.

The well was drilled to 11,722 ft. and completed through perforations at 8,650-55 ft. Zapata Off-Shore Co.'s Vinegarroon did the drilling and successfully rode out Hurricane Carla during the operation.

The two wells currently are shut in pending further development of the field by Shell and its partner, Phillips Petroleum Co. Block 160 cost $2.8 million in bonus payments to the federal Government.

A Shell spokesman said it may be a year or more before the company has done sufficient drilling in the block to justify a pipeline.

"We will still be wildcatting until the areal extent is proven," he said. "We certainly can't classify it yet as a commercial field."

The oil industry has spent at least $100 million looking for oil beyond Texas 3-league limit—but without commercial success (OGJ, Sept. 4, p. 96).

Since 1954, Interior Department has sold leases in offshore Texas on three occasions.

Altogether, the sales have produced $67.5 million in bonus money for a total of 457,388 acres. Shell has laid out the largest sums for the right to drill.

Incentive gas pricing—1

Producers offer FPC a new approach

Henry D. Ralph
Chief Editorial Writer

AN ENTIRELY new approach to the problem of federal regulation of the field price of natural gas is being taken by the producing industry in the area-price hearings before the Federal Power Commission.

If the producers' thesis is accepted by the commission—and by the courts—it could point the way out of the regulatory mess of confusion and frustration, perhaps even without a new gas law.

Even if important parts are accepted as a working goal, the new approach could make a mighty cut in the paper work and haggling involved in the old system of analyzing thousands of individual contracts and cost figures.

In essence, the theory of the new approach is:

1. FPC's job is to make sure prices are high enough to maintain adequate supplies, but low enough to permit gas to compete with other fuels.

2. Detailed control should be exercised only where the normal competitive forces of the market are not achieving this balance.

In other words, field prices meet the statutory test of being "just and reasonable" when supply and demand are in approximate balance and there is neither a significant shortage nor surplus.

This approach was not possible so long as FPC was trying to fix specific prices for individual producers on a cost-of-service formula.

But when, a year ago, FPC virtually abandoned the cost-of-service method in its Phillips opinion and called for a series of area-price hearings, the way was opened for new ideas. Producers had a chance to offer the commission a tangible and practical method, and it was unveiled at the first formal area hearing—dealing with the Permian basin—in Washington October 11.

1. Use of costs

Perhaps one of the most important aspects of the Washington presentation is that the producers have abandoned their once-adamant opposition to consideration of costs in any way, shape, or form. Instead they are showing the commission how to use cost data properly, and are giving it meaningful cost figures and analyses.

In addition, they appear to have solved the once-insuperable problem of allocating exploration and discovery costs between oil and gas—at least sufficiently so that FPC can exercise an informed judgment.

These moves accomplished by compiling and analyzing industry-wide and area-wide cost figures instead of specific costs for an individual producer or lease.

The thinking is that FPC is (or should be) concerned with the broad picture presented by average prices and costs, regional supplies and requirements, and the condition of the gas industry as a whole. So the bulk of the presentation is on a national basis, with only portions dealing specifically with the Permian basin segment. If FPC accepts this foundation work, future area hearings should be much simpler.

Big job. It required 14 witnesses and a foot-high stack of prepared testimony and exhibits to encompass the producers' presentation in what FPC calls the "economic phase" of the proceedings. More detailed cost figures applying specifically to Permian-basin operations are to be presented later. But the economic presentation is so replete with cost data that the producers feel it is virtually a complete case in itself.

It was a monumental job. In the course of preparation, the working staff uncovered information about the producing industry that the industry itself never knew before. But primarily it developed data to substantiate and pinpoint many concepts of price regulation which until now producers have been able to advance only as rather vague and unsupported opinions and arguments.

So while the thread of reasoning behind this Permian-basin presentation is not entirely new, for the first time it is presented with unity and coherence, and backed up with reams of authoritative and significant statistics.

Gas-price series

THIS is the first in a series of articles which analyze the industry's presentation on gas prices at the recent Permian-basin hearing.

The second article will appear next week.

2. Producers' premises

In brief, the producers' approach rests on these premises:

1. There is sufficient competition among producers and field purchasers of gas so that natural market forces generally play their normal role. Therefore FPC should be concerned with general levels of prices and with specific cases which seem out of line, and should not attempt to reconstitute the industry or control minor details of operations and contracts.

2. The traditional utility rate-fixing method is inapplicable to producers, so FPC must adopt a new approach which will use price as a tool to balance supply with demand and bring gas to market. No mechanical formula will achieve this, so FPC must apply its judgment to a wide range of pertinent data.

3. Gas production can be, and is becoming, a separate operation from oil production and therefore joint oil-gas costs can be allocated as to gas with a reasonable degree of accuracy.

4. The oil end of the business will not bring forth as a by-product sufficient gas reserves to meet future demands, so gas must stand on its own feet. Cost studies show that gas is not doing this and that producer revenues from gas are not sufficient to increase gas supplies as

Controls put on "mixed" intrastate gas

THE Federal Power Commission has ruled that governmental pricing controls apply to natural gas intended for intrastate use, under certain conditions.

By a 3-to-1 vote, the commission held last week that when intrastate gas is mingled in a pipeline with gas intended for out-of-state use, federal regulations affect the "local" gas.

It was the "new" FPC's first major decision on natural-gas prices. And the ruling overturned a 1956 commission interpretation which had been upheld in federal courts.

A spokesman for the FPC staff says there is no way of telling how many contracts will be affected by the ruling, but that the total amount of gas involved probably won't be significant.

The ruling, handed down by FPC Chairman Joseph C. Swidler, dealt with proposed gas sales to El Paso Natural Gas Co. Lo-Vaca Gathering Co., Corpus Christi, Tex., and Houston Pipe Line Co., proposed to sell a total of 120,000,000 cu. ft. of gas daily to the El Paso firm.

Lo-Vaca's contract involves gas to be used by the purchaser outside Texas in compressor stations and treating plants, but not to be resold. The Houston Pipe Line contract calls for El Paso to use the gas inside Texas as fuel for compressor stations and a gasoline plant.

Since the gas would not be resold in interstate commerce, the prospective sellers argued, it should be exempt from any regulations.

But the commission majority ruled that mingling the gas with other gas going out of state would prevent the FPC from determining which was being used by El Paso only and which was being resold.

Commissioners Charles R. Ross and Jerome Kuykendall supported Swidler. Howard Morgan was away from Washington.

The dissenter, Lawrence J. O'Connor, maintained the ruling was a departure from judicial precedent. He called it "unnecessarily harsh."

O'Connor pointed out that in 1956 the FPC ruled it did not have jurisdiction over certain gas sales by North Dakota producers to Montana-Dakota Utilities Co., because gas for intrastate use was tapped off before it crossed the state line. This was the decision which later was sustained in the courts.

much as needed. By that standard, the level of gas field prices is less than "just and reasonable," both in the United States in general and in the Permian basin in particular.

5. The cost of finding new gas reserves cannot be ascertained from the exploration expenditures of a few or even all producers during a "test year" or other short period, as most producers have curtailed their exploration budgets and are liquidating their reserves. Because of the time lag in exploration, the cost of developing new reserves must be anticipated many years in advance.

6. Demand is outpacing reserves so rapidly that within a few years there will be difficulties in meeting full-line deliverability. Then consumer prices will go up sharply, regardless of field prices. And it will be too late to depend on higher field prices as a stimulus to new exploration.

7. The assurance that most present control prices will be collected, and that future contracts may be written at somewhat higher prices if economic conditions warrant them, will spur the incipient shift toward specific exploration for gas and thus assure consumers of adequate reserves down the road.

It may be anticipated that consumer spokesmen will protest that this approach to regulation is, in effect, no regulation at all. In defense, the producers argue:

That the heart of the regulatory problem is to find field prices which will cover the financial requirements of the producing industry in maintaining supplies.

That analysis of the industry's economic costs, as distinguished from individual cost-of-service determinations, provides a workable measure of financial requirements.

3. What FPC asked for

The producers' new approach is carefully designed to meet the specifications for regulation laid down by FPC September 28, 1960, in the Phillips opinion (No. 338) and the statement of policy on area pricing (No. 61-1).

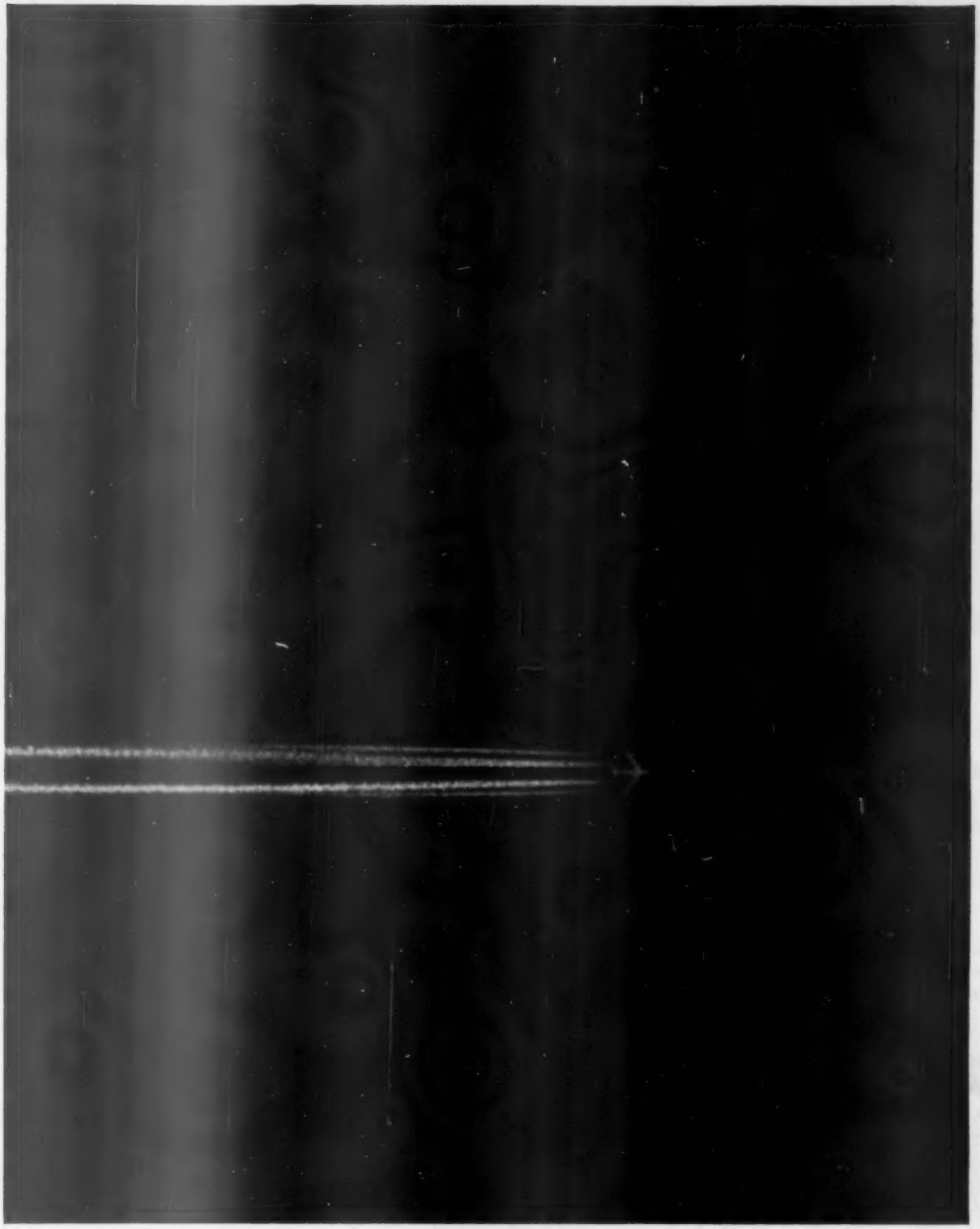
In those documents, the then members of the commission made such statements as "consumers will be protected if we place more reliance on existing prices and on applicable economic principles . . . natural gas has been substantially underpriced . . . the ultimate solution will be in the determination of fair prices for gas based on reasonable financial requirements of the industry."

"Our ultimate objective," said FPC at that time, "will be to set prices in all producing areas which will be adequate to maintain the gas supplies needed by the consumers of the nation, but at prices that are no higher than are necessary to accomplish that purpose . . . farsighted gas-rate regulation will concern itself with the present and the future, rather than with the past . . . it will take account of conditions and trends at the source of the supply being regulated. It will use price as a tool to bring goods to market—to obtain for the public service the needed amount of gas."

The commission also said that in setting area prices it intended to make use of cost data and also of all information of an economic nature, such as existing and historical price structures, volumes of production, trends in production, price trends, trends in exploration and development, trends in demands, and the available markets for gas.

In the ensuing year all interested parties have complained that these policy statements were too vague to form the basis for regulation, and that the commission should have spelled out a formula in detail.

The producers' Permian-basin presentation has filled this gap. It not only spells out a legally sound theory of gas regulation, but also gives the commission the tools for applying it in the form of voluminous economic data of the sort FPC requested but never before has had.



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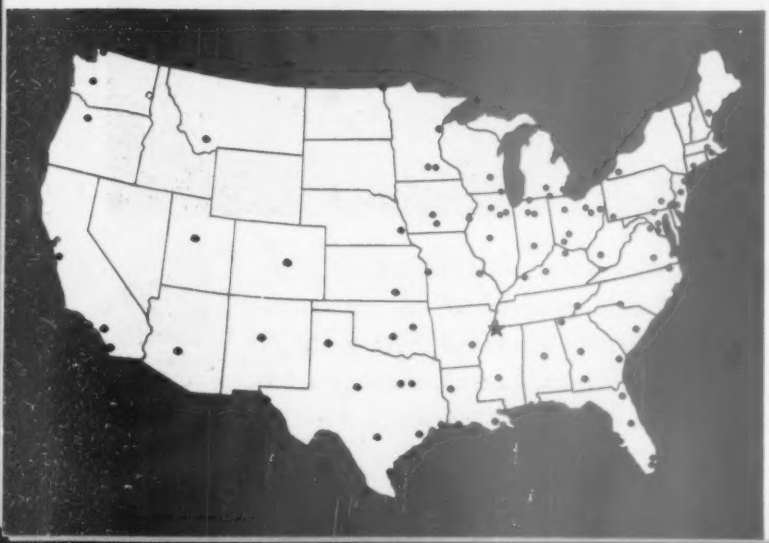

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This multifuel engine may "join the Army"

FURTHER progress has been disclosed in the military's efforts to develop a practical multifuel engine to simplify fuels supply.

The U. S. Army Ordnance Corps has unveiled a new compression-ignition engine as light and compact as a conventional gasoline engine of equal horsepower. And it uses only 60% as much fuel, ranging from low-grade gasoline to a half-and-half gasoline-distillate mixture and JP-4 fuel.

The ability to operate on the variety of fuels interchangeably was demonstrated by Avco Corp., Lycoming Division, the developer under Army contract, at Williamsport, Pa. Using low-grade gasoline, the engine was started unaided at −25° F. by means of electric-glow plugs in the combustion chamber.

The engine demonstrated is a four-cylinder, two-cycle air-cooled 90° V-type, developing 160 brake hp. with a 312-cu.-in. displacement and 18.7-to-1 compression ratio. It weighs 600 lb. Avco also has in the works six and eight-cylinder models of up to 325 hp.

This family of engines is among several under development by the Army for tracked and wheeled vehicles. Several are being field tested.

Besides simplifying logistics, the use of a diesel-type engine with its fuel economy would increase the range of Army vehicles and thus fulfill a major objective. It would also help to stretch middle-of-the-barrel supplies needed for essential domestic use during an emergency.

COLD-ROOM TEST—engine started without auxiliary power at —25° F.

Canada approves large butane exports

FEDERAL approval to export 22,120,000 imperial gallons of butane from Alberta to affiliated refineries in Anacortes, Wash., has been received by Shell Oil Co. of Canada, Ltd., and Texaco Exploration Co.

The National Energy Board granted licenses to Shell for 200,000 bbl. and to Texaco for 432,000 bbl., amounting to a combined volume of 1,732 bbl. daily over the next year. The butane would be used in gasoline blending and for alkylation feed stock.

Product will be shipped from the Bonnie Glen and Rimbey plants, and possibly from the Goliad plant in Pembina field. Butane will be injected into the crude stream of the Texaco Exploration pipeline for delivery to Trans Mountain Oil Pipe Line at Edmonton. The mixture, having a Reid vapor pressure of less than 13 lb. at 100° F., will be batched to the two Anacortes refineries.

Shell Oil Co. will pay Shell of Canada at least 3.1 cents Canadian per imperial gallon, f.o.b. the Rimbey plant. Texaco Inc. will pay Texaco Exploration at least 3.25 cents f.o.b. the Bonnie Glen and Rimbey plants.

Delivered cost to Shell at Anacortes will be 5.09 cents an imperial gallon. Delivered cost to Texaco at Anacortes will be 5.13 cents for Bonnie Glen production and 5.22 cents for Rimbey production.

Tidewater discovers fuel for Avon refinery

TIDEWATER Oil Co. may have a gas field under its Avon refinery near San Francisco.

Last week the company was drilling ahead at the Avon unit 1 after the well flowed at the rate of 5,250 M.c.f.d. through a ½-in. choke from 4,568-4,680 ft. during a 1-hr. drill-stem test.

The well, in Sec. 12-2n-2w in Contra Costa County, is on a 968-acre tract adjacent to the big refinery. Monsanto Chemical Co., owner of the tract, and McCulloch Oil Corp. are partners in the well.

The flow during the test came from the Domengine sand which has produced two prolific wells about 1½ miles to the west in Los Medanos field. Whether the pay extends under the refinery can only be determined by further drilling.

One of the McCulloch wells in Los Medanos, the Duarte 1, has 345 ft. of continuous pay and an open-flow potential of 170,000 M.c.f.d. It is rated as one of the best gas wells in California. The Duarte well paid out in 2 weeks (OGJ, Oct. 2, p. 244).

Humble wins again in court tussle on jet-drill-bit patent

THE U. S. Supreme Court has refused for the second time to review a lower court decision knocking out a $250-million lawsuit against Humble Oil & Refining Co. charging infringement of a jet-drilling-bit patent.

The lawsuit was brought in 1953 by Kinnear-Weed Corp., Beaumont. Other suits were filed by the company against Hughes Tool Co., Reed Roller Bit Co., and Hunt Tool Co.

In the most recent development in the long case, Kinnear-Weed charged that the judge who tried the case originally, Federal District Judge Lamar Cecil, owned Humble stock and that Humble was conducting oil operations on property owned by Cecil.

William E. Kinnear, Beaumont attorney for the plaintiff, says he will "continue to pursue all legal remedies" in the case.

Geological data protected in "bank"

New service offers maximum safeguards for company records.

GEODATA SERVICE'S new building in southwest Houston is designed to provide maximum security for oil-company records.

A NEW KIND of service for storing and handling exploration records and other valuable data for oil companies is ready to open its doors in Houston.

The key to the new service is the building which has those doors. It will house records and furnish working space to the companies which own them. And it will offer year-round air control and security not usually available in company buildings or in warehouses.

Geodata Service, Inc., organized by geophysicists Paul Farren and G. J. Long, puts emphasis on service in preference to storage. It expects to be more than a warehouse for its clients' seismic records, magnetic tapes, electric logs, aerial photos, and other secret data.

The building has considerable office space where company representatives can work on their data in privacy.

Geodata has taken elaborate precautions in construction of the building to insure safety and security for the materials while keeping them readily accessible.

Temperature and humidity ranges meet rigid specifications for stored film, and standby power will insure continued operation of the air-conditioning system. Additional safeguards for the records include fire and burglar alarms connected to a downtown switchboard, a sprinkler system, and gas detectors. Speakers throughout the building provide communications for all users of the service.

To keep unauthorized people out of the building, Geodata will require everyone to punch a time clock and sign a register after entering from the front. Back doors are controlled electrically from executive offices.

The 2-story building has 24,400 sq. ft. of space, of which 18,000 is for storage. It has 36 steel locked bins, each with a capacity of more than 1,500 boxes measuring 9 by 10 by 30 in. A radio-controlled overhead conveyor circuit moves materials.

Geodata itself will have no staff to perform its services. The work will be done on a contract basis by employes of two consultant firms operated by Farren and Long in the same building.

Farren says he expects other consultant firms to use the building when working on data for their client companies.

More than a score of companies already have indicated their intention to use Geodata, among them most of the Houston majors.

Geodata also will be the headquarters of a new drill-stem-test library being established this week in Houston (see below).

Another new service:

Drill-stem-test libraries

MAJOR and independent oil-producing companies have joined forces to organize centers in Houston and Oklahoma City for exchanging drill-stem-test data.

The two centers, or libraries, will serve virtually the entire oil patch east of the Rockies except West Texas.

The decision to pool drill-stem-test charts and information was made by several oil-company representatives at a meeting in Oklahoma City last month, and rules were drawn under which participants will contribute to the libraries and take information from them.

Arrangements also were made to cooperate with three similar centers operated by Petroleum Research Corp. at Denver, Midland, and Calgary for the Rockies, West Texas, and Canada.

Geodata Service, Inc., a new service and storage company (see above), will establish the drill-stem-test library in Houston this week, while Riley's, Inc., a photocopy firm, will operate the Oklahoma City center.

Geodata and Riley's will make no charge for storage but will collect fees for making reproductions and for servicing requests for information and data.

Participating companies have agreed to furnish the centers their drill-stem tests in return for the privilege of using the libraries. Tight-hole tests won't be furnished immediately, but will be turned over eventually to the libraries under a "good-faith" agreement.

The centers are expected to get several thousand copies of old tests at the beginning and then keep up to date on new ones.

Halliburton Co. and Johnston Testers, Inc., service companies which conduct a large majority of

drill-stem tests for the industry, have agreed, when authorized, to prepare an extra copy of their tests for the libraries.

Geodata will be responsible for filing the drill-stem tests for the Gulf Coast, all of Texas except West Texas, Louisiana, Mississippi, and other southeastern states. Riley's will handle Oklahoma, Arkansas, Kansas, and the northern and eastern states.

Together with the three Petroleum Research Corp. centers, the new libraries will cover all the United States except the Pacific Coast.

Ralph Tenney, Shell Development in Houston; James Roach, Sohio Petroleum in Oklahoma City; and Robert B. Robinson, Sinclair Research in Tulsa, are among the leaders of the industry committee which established the centers.

Tenney says that in years past companies have been reluctant to release drill-stem-test information to competitors but that this attitude is now changing.

Roach says the venture will be a big money-saver and time-saver for the participants. Heretofore companies had to check individually with each other for test information that might be available. Under the new setup all the tests will be available, for a reasonable fee, on call.

Strike closes Gulf refinery

GULF Oil Corp. was forced to close down its huge Port Arthur, Tex., refinery last week.

The shutdown came when 180 machinists went on strike and some 3,500 members of the Oil, Chemical and Atomic Workers union observed the picket lines.

Gulf has been disputing with both unions for several months over the issues of job security and contracting work at the plant.

Labor contracts with the unions were on a day-to-day basis since last May.

When the machinists cancelled their contract on October 21 and called a strike, OCAW members refused to cross the picket line on the next shift and subsequently cancelled their own contract.

Gulf's last major strike was in 1959, but twice this year the plant was shut down—once by the maritime strike and later by Hurricane Carla. Whether the latest closing will result in proration of crude purchases for the 272,000-bbl. plant depends on when the current disputes are settled. No proration is likely before Nov. 1.

Plant manager J. O. Timms told striking machinists that Gulf considers its right to contract work "is a matter of principle and a necessity on which we are unable to place a bargaining price."

As for job security, Timms said Gulf does not expect to have a surplus of employes before placing a new methyl - ethyl - ketone unit on stream next summer, and even then there is little likelihood that machinists would be laid off.

Tests lend support to inorganic theory of oil, gas accumulation

GOVERNMENT scientists in Tennessee have turned up new evidence relating to the inorganic theory for oil and gas accumulation.

In a preliminary report, the chemical technology division at Oak Ridge National Laboratory says uranium carbide will react with water at moderate temperatures to form a gas which has many characteristics of natural gas.

With the exception of the presence of hydrogen, the gas resembles natural gas as it is found in the earth. At a carbide to uranium mole ratio of 0.99, the gas composition was 10.4% H_2, 86.7% CH_4, 1.8% C_2H_6, and 1.1% heavier.

Processing briefs

Aurora Gasoline Co. has awarded construction contracts on a 10,000-bbl. Platformer, 2,200-bbl. Unifiner, and Udex extraction unit to be built at its Detroit, Mich., refinery. The project is in connection with Aurora's agreement to supply 20 million gallons of benzene and toluene annually to Dow Chemical Co. at Bay City, Mich. Procon, Inc., will perform the work.

SBR capacity at Goodrich-Gulf's Institute, W. Va., plant is being increased by about 8%. The expansion includes addition of polymerization reactors and related equipment. Muehlman Engineering Service, Inc., Charleston, W. Va., has the contract and completion is expected by the end of this year.

Another piperazine unit will be added to Jefferson Chemical Co.'s Conroe, Tex., plant. It will be completed during the second quarter of 1962. Piperazine is an ethylene-oxide-derived specialty chemical.

A film plant will be built adjacent to Novamont Corp.'s new isotactic polypropylene resin plant at Neal, W. Va. The latter, dedicated last week, is the first U. S. operation of the Italian-owned Montecatini firm.

Mississippi's governor has signed six bills that clear the way for construction of Standard of California's refinery at Pascagoula, Miss. The bills provide tax advantages and other considerations.

A proposed refinery site on Cook Inlet, Alaska, has been purchased by Standard of California. The company paid $250,000 for the 481 acres. Initial plans call for a 20,000-bbl.-daily plant which will cost $11 million to build.

Monsanto Chemicals has signed an agreement with Frutarom Electrochemical Industries, Ltd., of Israel to provide technical aid for the production of polyvinyl chloride. This will be made from ethylene dichloride produced by Frutarom and Palestine Potash, Ltd. Delek, a local marketing company, recently acquired 20% interest in Frutarom.

Capacity operating rate of 70 million pounds of styrene yearly has been attained by Sinclair-Koppers Chemical Co.'s styrene plant, at Houston, less than 6 weeks after start of production. The plant made its first finished product on September 11, during Hurricane Carla, and operated throughout the storm.

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GLYCOL ABSORPTION DEHYDRATION

Low initial capital expenditure, simplicity and low cost of operation have established the glycol dehydration process as the most practical for the natural gas industry.

Triethylene glycol is the most commonly used glycol for dehydration by absorption. HI-DRY®, Jefferson's tetraethylene glycol desiccant, is used in absorption units where additional dew point depression is required. Diethylene glycol is preferred in vacuum regeneration type absorption units and in the mixed glycol-amine process which dehydrates and sweetens simultaneously.

RECONCENTRATION

The amount of dehydration obtained by the glycol absorption process is limited by the amount of water left in the lean glycol after reconcentration. A lower water content may be obtained in the lean glycol solution by the use of vacuum reconcentration or stripping gas without exceeding the maximum recommended temperatures of reconcentration shown below.

Glycol	Initial Decomposition Temperature, °F.	Recommended Reconcentration Temperature, °F. max.
Diethylene	328	340*
Triethylene	404	375
HI-DRY®	460	430

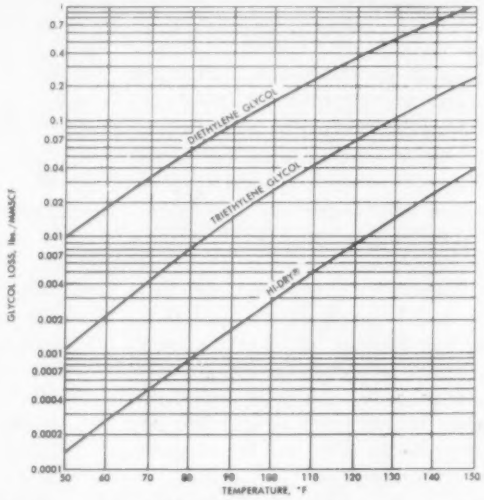
**When oxygen or hydrogen sulfide are present, lower temperatures in the range of 310° to 320° F. are recommended.*

GLYCOL LOSSES

Control of glycol losses is one of the most important operating problems in absorption type dehydration plants. Normal glycol consumption will usually run less than 0.5 lb./MMSCF in the larger plants which have close supervision of operation. A glycol consumption of 1.0 lb./MMSCF for field units is generally acceptable. Average cost for glycol make-up requirements will account for about 30 to 40% of the total operating costs.

Major glycol losses result from (1) flooding of the contactor by surges of gathering line liquids and (2) entrainment of glycol in the contactor overhead. Mechanical leakage can also be significant. At normal contact temperatures, equilibrium glycol vaporization losses are relatively minor in comparison with the total glycol loss. When high contact temperatures are involved, glycol vaporization losses become more important in the overall cost of operation. Figure below can be used to estimate equilibrium glycol vaporization losses.

CALCULATED EQUILIBRIUM VAPORIZATION LOSSES AT 1000 P.S.I.G. VERSUS TEMPERATURE



This figure shows that the higher glycols, such as triethylene glycol and HI-DRY® desiccant, have the advantage of low vaporization loss at the higher contact temperatures.

DESIGN CONSIDERATIONS

In recent years there has been a tightening of water specifications on gas sold to transcontinental pipelines. As limitations are reached in reconcentration of the glycols, the amount of contact and glycol circulation rates become increasingly important. Glycol circulation rates of three gallons per pound of water absorbed and four tray contactors meet normal dehydration requirements. Locations needing maximum dew point depression may use circulation rate of 10 to 15 gallons per pound and contactors with six to eight trays.

Installation of an inlet gas scrubber to prevent contactor flooding and a contactor overhead mist eliminator for prevention of entrainment are recommended design features.

For complete information on Jefferson glycols, ethanolamines, and helpful technical services . . . contact Jefferson Chemical Company, Inc., 1121 Walker Avenue, P. O. Box 303, Houston 1, Texas.

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JEFFERSON CHEMICALS

AERIAL view shows violence of Humble's gas blowout in Galveston Bay.

Humble fights blowout in bay

HUMBLE Oil & Refining Co. is making a two-way effort to choke off a spectacular—and expensive—blowout in Galveston Bay.

The dually completed gas well had tapped a new deep sand at 12,100 ft. in Red Fish Reef field and then blew out under pressures of 8,000 psi. shortly before it was to go on production.

Located in about 9 ft. of water, the well apparently cratered and could not be extinguished from the surface by fire fighter Paul N. (Red) Adair. Humble then decided to go to the sand source itself by two routes.

The primary effort is a directional relief well to be drilled by Falcon Seaboard Drilling Co. from a point about 1,800 ft. southeast of the blowout. Injection of fluid will follow to kill the gas flow.

The second effort, much faster but less certain to succeed, will be the deepening of a 10,800-ft. well located 1,000 ft. from the blowout. The operators will aim for the upper sand, at 11,600 ft.

Since the hole will be deepened only 800 ft., directional drilling would not place it much closer to the blowout hole, and the injection of a killing fluid may not be successful. The operators also expected difficulty in trying to deepen beneath the small 5½-in. casing which was run in the 10,800-ft. hole.

Humble expects the drilling of the relief well to take 60 to 90 days, while the deepening project could cut weeks off this time.

The blowout well is the State A-116 Red Fish Reef field, 2½ miles southwest of Smith's point, or a little more than 2 miles northeast of the Houston Ship Channel.

When the blowout occurred October 22, flames shot skyward some 100 ft. but later settled to around 20 ft.

Some Canadian rig crews given wage boost of 20 cents

SOME Canadian drilling contractors are raising rig-crew wages following a similar move in the U. S.

Regent Drilling Co., Ltd., and Parker Drilling Co. of Canada, Ltd., were among the first to act when they gave their crews a 20-cent-hourly boost 2 months ago.

Brinkerhoff Drilling Co., Ltd., and Canbridge Corp., Ltd., raised the same amount October 15.

Arrow Drilling Co., Ltd., plans an increase soon, but the amount has not been decided.

Other contractors are taking a look at the wage situation and will make a decision in the next few weeks.

Canadian contractors who support the increase say it's necessary to keep experienced hands and to attract new talent.

Others have taken a "wait and see" attitude. They contend present footage rates don't justify a wage boost, and it seems untimely to hit the industry with higher rates.

Canadian drilling crews had their last pay increase in 1958-59. It amounted to about 15 cents an hour. Up to now, contractors have been paying an average of $2.75 for drillers, $2.05 for derrickmen, and $1.85 for roughnecks.

New drilling firm created to operate on world-wide basis

A NEW international company has appeared on the contract-drilling scene.

One Mexican and four Canadian companies have incorporated Worldwide Drilling Co., Ltd., for operations on a global basis outside of Canada. The new firm will draw on the talent, equipment, financial backing, and other resources of its owners.

The company was organized by Commonwealth Drilling Co., Ltd., General Petroleums Drilling Co., Ltd., Hi-Tower Drilling Co., Ltd., and Precision Drilling Co., Ltd., all of Calgary, and Perforadores Mexicanos de Petroleo of Mexico City. They own 84 rigs.

Worldwide's operations "are to be conducted solely outside of Canada and in no way relate to the domestic operations of the individual companies," say officials of the new firm.

First joint venture is in the Poza Rica area of Mexico where Worldwide is handling development drilling for Pemex.

The company's Latin American headquarters are in Mexico City. An office in London is directing European and Middle East operations.

Worldwide's officers are: J. A. Scrymgeour, Commonwealth, president; J. H. Storey, Precision, vice president; and W. H. Atkinson, Commonwealth, secretary-treasurer.

Atlantic: Rebounding with optimism

The decline has been reversed, and the outlook is nothing but excellent, says President Supplee. Atlantic has licked its private problems, become more self-sufficient in crude, has diversified, and sees big profits ahead.

A PICTURE of buoyant optimism is presented by Atlantic Refining Co. in the midst of industry pessimism caused by weak products and crude-oil prices.

Henderson Supplee, Jr., president of Atlantic, has talked in recent years of the struggle to build a crude-short company in an industry whose main source of profit is its raw material. Appearing before the New York Society of Security Analysts last week, he made it clear that he could see the efforts bearing fruit.

"Atlantic has been behind the industry — beset by private weaknesses, hurt more than the average when the going was rough, not able to benefit equally when the industry was enjoying periods of prosperity," he said.

Now, however, "Atlantic has brought itself up to its competition. We are not dismayed by the industry's common problems, because we have a company program to cope with them—just as we developed and executed a program to attack Atlantic's individual weaknesses."

Here are the main reasons why Atlantic is now "up to its competition":

Increased crude production, with a self-sufficiency expected to exceed 90% in 1962, and increased gas production.

Improved efficiency.

Increased product sales.

Nonpetroleum diversification — principally chemicals.

The road back. Atlantic had its peak year earlier in the postwar boom than most major integrated companies.

Its best year was in 1953 when net income was $49,755,000. Supplee's rebuilding program began to pay off last year. With earnings of $46,566,000, Atlantic halted a 3-year trend of declining profits.

Profits the first 9 months of 1961 were $31,699,000, up 16% over the same 1960 period. This was in spite of a $10,050 000 third quarter, which, because of lower product prices and higher Venezuelan income taxes, was slightly below the third quarter of last year. But the full year is expected to be better than 1960, approaching Atlantic's best previous performance.

Atlantic's Supplee
". . . not dismayed by problems."

And, Supplee predicts, 1962 will be a year of "accelerated profit growth," while over the next 5 years profits will increase substantially.

Oil and gas production. A sharp climb in oil and gas production is the principal source of the Atlantic president's optimism toward the future.

With crude production increasing from 109,000 bbl. daily in 1956 to about 160,000 bbl. daily in 1961, the company's self-sufficiency will have increased from 53% to more than 80% of refinery needs.

The growth came from the purchase of Houston Oil Co., prolific new concessions in Lake Maracaibo, Venezuela, and intensified domestic drilling—especially in the Gulf of Mexico.

"A year from now," Supplee forecasts, "with facilities for greater production in Lake Maracaibo, and with a contract already operating for sale of higher production, we are budgeted for the first time in Atlantic's history for a net production that will exceed 90% of the volume of our refinery throughput."

He points out that of the 20 integrated majors, only five now exceed Atlantic's present degree of self-sufficiency.

A large proportion of the boost came from Block 1 in Lake Maracaibo, where Atlantic (with Sun and Texaco) has 52 producing wells, some of which are expected to yield 25 million barrels. Atlantic's share is about 30,000 bbl. daily.

When the purchase of Argo Oil Corp., Denver, is completed, about 13,000 bbl. daily in additional crude output will further improve its position.

Atlantic has grown to ninth in the industry in natural-gas reserves, and has moved from annual sales of $700,000 in 1946 to $30,000,000 this year.

Improved efficiency. As a result of $140 million in capital expenditures over 10 years, the Philadelphia and Port Arthur refineries now produce a 20% greater volume of more diversified, high-quality products with 23% fewer people.

Five current manufacturing projects will boost profits an estimated $4,000,000 to $5,000,000 per year.

Atlantic's new Met-X process, which is going on stream at the Philadelphia refinery, is expected to mean $31 million yearly in added profits. This process for deactivating metal contaminants that lower efficiency of catalytic cracking, will improve yields of more valuable products (OGJ, Oct. 9, p. 72).

Other profit-boosting projects are:

Revamping a 6-year-old butylene alkylation unit at Philadelphia to improve operation and increase capacity. It will permit shutting down

a World War II unit, decreasing operating costs and improving quality.

Completing a large aromatics-production complex within the Port Arthur refinery and in jointly owned facilities located within the Pure Oil Co. Smith's Bluff refinery.

Wax-treating and finishing equipment being installed as an adjunct to newly completed wax-producing facilities.

Installation of deisobutanizer fractionating towers at both refineries, boosting volumes of high-octane gasoline to permit a higher premium sales ratio and to reduce operating costs.

Increased product sales. Atlantic expects 1961 domestic petroleum-product sales volume to be 3½% higher than in 1960, and sales revenues to be up about 4.7%.

Further improvement is expected as marketing facilities and activities receive increased attention. In recent years, when emphasis was on building crude self-sufficiency, marketing bore the brunt of capital diversion. However, capital spending for marketing doubled from 1958 to 1961.

Newly purchased furnace-oil-marketing subsidiaries are expected to sell $30 million worth of products and services next year, contributing dividends to the parent company. Premium gasoline sales ratio has increased 3% over 1959 and is now above the industry average.

Product diversification. Chemicals represent what Supplee calls "diversification to nonpetroleum areas for higher growths and returns."

Atlantic has decided on product areas and method of approach, Supplee says, and expects the current annual sales rate of $30 million to increase greatly in the future.

As examples of this expansion, he cites the Gulf Coast aromatics plant and the purchase of majority interest in a company providing "an excellent forward marketing position in polyvinyl chloride plastic."

"If only part of our plans and efforts materialize," Supplee says, "Atlantic's metamorphosis will accelerate."

Sinclair to sell Texas Pacific stock

SINCLAIR Oil Corp. has agreed to refrain from further effort to absorb Texas Pacific Coal & Oil Co. in an antitrust settlement with the State of Texas.

The agreed settlement, somewhat similar to a consent decree, disposes of a suit filed by the state in January 1959 to block a merger of the two firms.

Under the settlement, Sinclair also agrees to sell its current holdings of Texas Pacific stock when it is able to do so profitably and to refrain from acquiring any more stock.

The state, in an accompanying action, dismissed its suit against Texas Pacific.

The action leaves Texas Pacific free to negotiate a merger with companies other than Sinclair. Actually, Sinclair could conceivably still buy out the Fort Worth company. But this could happen only if Texas Pacific, with no Sinclair influence, decided to liquidate and Sinclair came through with the best bid.

Sinclair now owns 1,121,692 of Texas Pacific's 3,905,665 outstanding shares—or about 28.7%. The court agreement permits the company to hold the stock because any immediate forced sale would cost it roughly $10,000,000. Texas Pacific stock was quoted last week at about $37.50, whereas the price was $42.38 when Sinclair bought the bulk of its holding on Aug. 16, 1956.

Pipeline briefs

First section of a 270-mile products line linking Humble's Baytown, Tex., refinery with San Antonio and Austin will be built by T-T Construction Co. The contract calls for 20.6 miles of 10-in. from Clear Lake to Pierce Junction, all in Harris County, Texas. Construction of the rest of the line will start early next year and be completed around April 1.

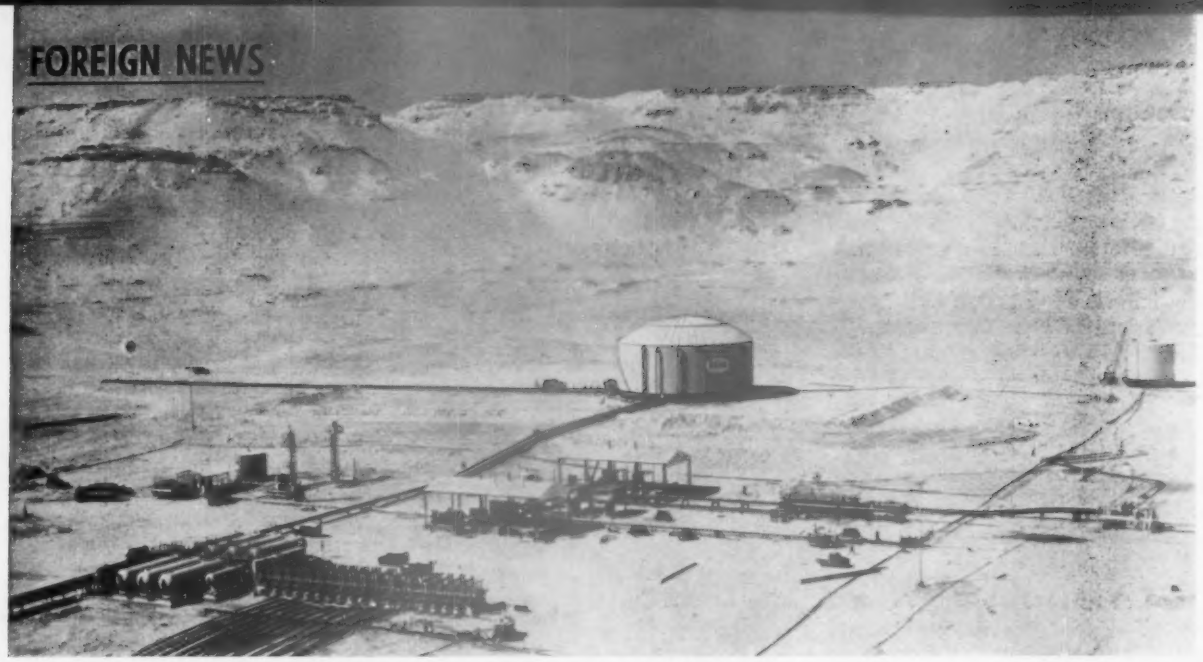
A new pipeline company has been organized to build and operate facilities for a refinery that Standard of California will build at Pascagoula, Miss. Cal-Ky Pipeline Co. will construct a crude gathering system in Mississippi and a products line from Pascagoula to the Plantation Pipe Line junction at Collins, Miss.

FPC has granted Transcontinental Gas Pipe Line temporary authority to deliver 99,290 M.c.f.d. of gas to 26 existing customers in New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Alabama, and Georgia. FPC earlier approved construction of the necessary facilities (OGJ, Aug. 21, p. 69).

Consumption of gas by electric-utility power plants was 202,580,093 M.c.f. during August, the highest monthly use on record, FPC reports.

New crude-gathering line will be built in Northeast Wyoming by Belle Fourche Pipeline Co. at a cost of $300,000. Wyoming's Public Service Commission approved construction of an 8-in. line running 11 miles north from Miller Creek pump station in Crook County; 4 miles of 4-in. northwest from the 8-in. terminus to a gathering site in Prairie Creek Oil field; and 3 miles of 6-in. lateral east from the 8-in. line to an unnamed oil field where Davis Oil Co. has its No. 1 Federal-Schuricht well.

Budget-type-construction applications have been filed with FPC by El Paso Natural Gas and Panhandle Eastern Pipe Line. Proposals are not related. El Paso plans to spend $5 million on new facilities in 1962. Panhandle proposes $2.5 million in construction during 12 months following authorization of specific projects. Both firms would use new facilities to handle gas bought from producers in area of their existing systems.



DESERT PLANT in Libya separates gas from Esso's Zelten oil. Crude then enters pipeline to Mediterranean.

Libyan oil pushes into world markets

Esso is now exporting Zelten crude at a rate of 60,000 bbl. daily from its Marsa el Brega terminal. Flow will be tripled by 1963 and an 8,000-bbl. refinery will be built at the port.

LIBYA officially became an oil-exporting nation on a respectable scale last week just 2½ years after its first major oil discovery.

The North African desert kingdom will move an average of 60,000 bbl. daily of high-gravity crude into world markets the rest of this year. Next year the flow will more than double. By 1963 it will triple.

The event was marked last week with just about as much pomp and ceremony as Jersey Standard and Libya could muster. King Idris I, the country's constitutional monarch, turned the valve to start the flow of crude through a temporary loading line to the Esso Canterbury moored in the harbor at Marsa el Brega.

The King's action was witnessed by a star-studded crowd of about 1,000 who flocked to the remote desert port miles from any Libyan center of population. In addition to Libya's Prime Minister Mohamed ben Otman Seid, Fuad Cabasi, Libyan minister of oil affairs, and just about every other government official of any standing, the ceremony was attended by M. J. Rathbone, president of Jersey Standard, and several of the Jersey directors.

The event marks a milestone in Libya's modern history and could well be the turning point for the country as a nation. It was a day for celebration in Libya, and Esso Standard Libya Inc.—with the help of its parent company—pulled out all the stops to make it a good one.

Robert A. Eeds, president of Esso Libya, used the occasion to announce that Esso Sirte will build an 8,000-bbl.-daily refinery at Port Brega. When completed in mid-1963, this plant can supply Libya's domestic demand for the four major petroleum products.

Loading the Canterbury climaxed an elaborate desert banquet of lamb and chicken cooked over charcoal in an 80-ft.-long broiler made by splitting a 40-ft. joint of 30-in. line pipe. The meal was served under a mammoth ceremonial canopy borrowed from the Fezzan Government and spread over the sand.

Guests for the affair flew or drove 500 miles to Port Brega from Tripoli to the west and Gengasi, 125 miles to the north. Parking space for the 150 automobiles was no problem. Until Esso Libya began construction of the port in 1959, there was nothing on this desolate coastline of the Syrtic Gulf except the ruins of an old Italian fort destroyed by shellfire in World War II.

Esso's finds. Zelten field, basically responsible for the celebration, was discovered by Esso on its big Block 6 in Cyrenaica in June 1959 when Zelten 1 came in on an oper-flow test at the rate of 17,500 bbl. daily. Number 2, a month later, made 15,000 bbl. daily and Libya, already suffering from oil fever, was off to the races.

Esso is now drilling Nos. 37 and 38 at Zelten and has 31 producers in the field. The field has a gas-oil separation plant with a capacity of 160,000 bbl. daily which was packaged by National Tank Co., Tulsa, and shipped to Libya in units. Crude from this plant is pumped only 20 miles north to an escarpment crossed by the 30-in. pipeline. From that point it flows by gravity to Port Brega 90 miles to the north.

A second field, Raguba, will be added to the pipeline and will pour

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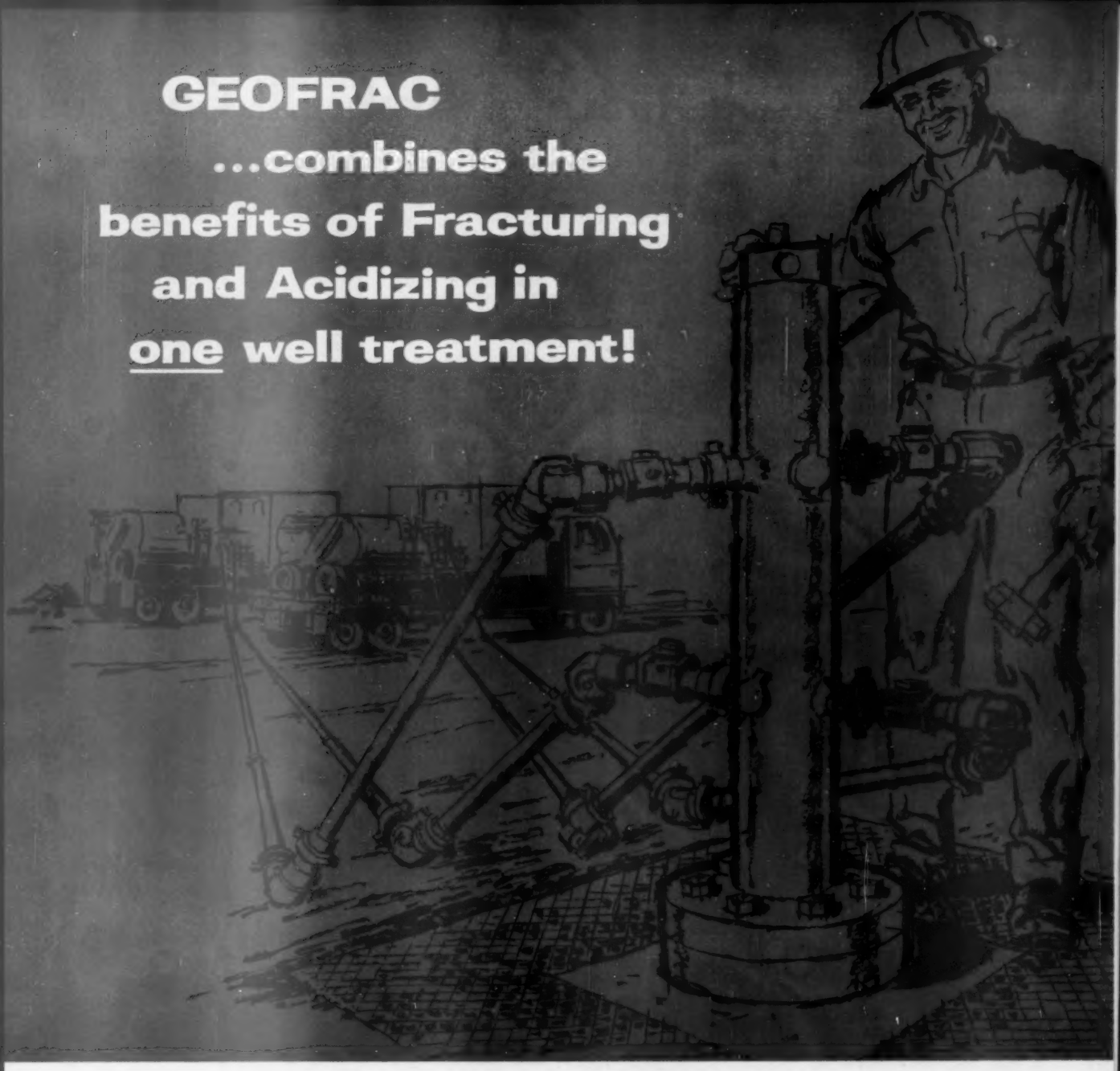

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another 5,000 bbl. daily into the system by late 1963. The Raguba discovery was made last January on Block 20 which Esso Sirte operates on a farmout arrangement with Libyan American Oil Co. and W. R. Grace. The first Raguba well tested 2,250 bbl. daily on a ½-in. choke. Since that time Esso has drilled 14 more wells, 11 of them producers.

Raguba will be linked to the 30-in. Zelten pipeline by a 50-mile, 20-in. spur. Raguba will have its own gas-oil separation facilities.

The port. Marsa el Brega, which Esso now calls Port Brega, is not a port in the accepted sense of the word. The site for the loading terminal was selected by Esso engineers because it has about the only point of land extending into the Syrtic Gulf. The oil company has built a concrete-caisson jetty for freighters and coastal tankers, but Port Brega's offloading will be by sea lines.

The tankers now being loaded are using a temporary marine loading line, but the company expects to complete a bow-mooring device to accommodate supertankers within a few weeks. The mooring device, 148-ft. tall, is resting in 100 ft. of water in the harbor. When put into operation it will allow a tanker to swing a full 360° without interrupting loading rates of up to 50,000 bbl. an hour.

Four floating roof tanks, each holding 268,000 bbl., will flow Zelten crude by gravity through 16,000 ft. of 48-in. line. Five positive-displacement meters will feed the crude into a 42-in. coated underwater line to the bow-mooring device 1½ miles offshore.

As usual in a formal terminal opening, last week's oil flow was not actually the first crude moved from Libya. Esso has been loading 25,000-ton tankers with test loads of crude for a number of European refineries for several weeks.

The Canterbury took the first such test cargo to Esso's Fawley refinery in Great Britain (OGJ, Sept. 25, p. 113). Similar shipments later went to Hamburg, Antwerp, and Sicilian refineries. This minor matter didn't bother the Libyans a bit last week. They have been waiting impatiently to become oil producers and exporters and this makes it official.

Peaceful Arab Oil Congress

Fred G. Thackeray

THE third Arab Oil Congress closed in Alexandria, Egypt, last week on a peaceful, moderate tone, but the big issues which divide western oil companies and producer countries are still brewing beneath the surface.

This was the most peaceful Arab Oil Congress yet. On that everyone is agreed. But, on any achievement involved there are almost as many opinions as there were delegates.

Delegates from Arab oil-producing countries are obviously delighted at the way the congress developed. Representatives of the western companies are a bit more cautious.

"There's just no common ground on which company and government delegates can meet," complained one oil man. This was in contrast to the company consensus that it was a good congress.

"We got off more lightly this time than at the two previous congresses," one company man put it. "It was much better than I expected," another said.

The congress chairman, Ahmed Kamel Badry, said he regards it as "striking" that major oil companies made an effort to express their points of view on some of the touchier economic and marketing issues. In the past companies have shown a tendency to keep a discreet silence when they were assailed by Arab speakers.

Shaikh Abdullah Tariki, Minister of Petroleum and Natural Resources in Saudi Arabia (who did not turn up until the third day of the congress) beamed when he was asked why this meeting was less explosive than in 1959 and 1960 at Cairo and Beirut.

"The companies have become more mature," he said.

Tariki repeated this later from the rostrum and it became a favorite theme of producer delegates from then on. The implication was that the companies are moving the way the exporting countries want them to move.

Another round of oil price cuts before the next congress—slated for next year at Beirut—would produce as much wrangling as before, probably far more intense. But, so long as they believe events are steadily moving in their favor, the big producer-exporter nations are apparently satisfied to keep up the pres-

Dr. Aziz Sedky
. . . Egyptian minister of industry opens congress for President Gamal Nasser.

OPEC meeting not

THE critical spotlight playing on both crude-oil prices and the profit split between the companies which produce oil and their host governments shifted last week from the sands of Alexandria to the cooler climes of Tehran.

It now appears that neither of the two critical points of dispute will be subjected to any more definitive action at Tehran than they were at Alexandria.

The Organization of Petroleum Exporting Countries opened its third formal and full-scale meeting late last week in the Iranian capital, but there is little to indicate that much more than organizational procedures will come out of the closed-door meeting.

The two basic conflicts between private companies and producing governments got some attention at the third Arab Oil Congress at Alexandria, but the touchy subjects

welcome change, but differences remain

sure without indulging in irrelevant histrionics.

The changed atmosphere at Alexandria could very well be summed up in three of the most prominent actors on the stages of previous congresses—Tariki was more jovial, Frank Hendryx, his American legal adviser, more laconic, and Emile Bustani, Lebanese businessman-politician and self-styled Arab spokesman, even more bombastic.

1. Two exceptions

There were really only two exceptions to this atmosphere of moderation. Both were privately discounted by Arab delegates as not representative of Arab thinking.

One paper among the numerous ones at the non-technical sessions was presented by Dr. M. L. Shoucair, assistant professor of political science at Cairo University and was titled "Relative Bargaining Power of Arab States and Petroleum Companies."

The paper was presented in Arabic with no text available in advance of the session. Non-Arab delegates had to rely on hopelessly inadequate simultaneous translation over headphones. The translation often broke down for minutes at a time.

The gist of the Shoucair paper was clear enough—western governments play a major role in the policies of oil companies. The British Government does this, Shoucair claimed, through its shareholding in British Petroleum Co., the French Government through its minority ownership of Cie. Francaise des Petroles, and the American Government through its general support of U. S. companies.

This thesis was accompanied by a frenzied finger-waving attack on general oil-company operations, liberally laced with accounts of what happened in various producing countries as long as 20 or 30 years ago.

Primary rebuttal to all this came from A. H. T. Chisholm, monocled representative of BP and a familiar sight at previous oil congresses. Chisholm told the speaker he was "plumb wrong" about BP and let it go at that.

The second bad moment in the congress came in an unscheduled paper presented on the last morning by Anwar Salama, secretary general of the Arab Petroleum Workers Union. Salama's paper carried a title indicating it was a treatise on the oil industry's effect on the economy of Arab countries.

Instead it turned out to be a swinging attack on oil company labor policies. Again in Arabic, the speaker made numerous charges of labor abuses throughout the Arab world, none of which he attempted to substantiate.

Only one company spokesman, H. L. Scott of Kuwait Oil Co. countered Salama's assertions. Scott answered his charges with brief, but highly effective, recital of worker pay scales and housing conditions in Kuwait's oil industry.

Responsible Arab delegates in private discounted both papers as uninformed tirades. Abdul Hadi Taber, director general of the ministry of petroleum in Saudi Arabia, commented flatly that Salama's paper was not representative of Arab opinion.

(Continued on Page 125)

likely to go beyond organizational procedures

were treated with such unaccustomed moderation that oil-company people could hardly suppress their surprise and pleasure.

Leading political figures of the producing countries — people like Abdullah Tariki of Saudi Arabia and Dr. Juan Pablo Perez Alfonzo of Venezuela—have made it clear that they believe OPEC is now the "action" group on such matters as pricing and profits. This places the Arab Oil Congress, once the forum for such matters, in the background.

OPEC had intended to lay before its members what it calls an "impartial" study of the relationship between oil-company investments and profits. It is now conceded that the outside study will not be completed in time for OPEC to consider it.

Study delayed. Only a week before the session was due to open in Tehran, an OPEC official, Sadek Husseini, revealed that Arthur D. Little, Inc., an American industrial-research firm, has been commissioned to do the study ordered by OPEC at its last January meeting in Caracas. Husseini admitted that the Little study would not be completed in time for the Tehran meeting.

This delay is almost certain to take most of the fire out of any action which OPEC might recommend. Without such a study the OPEC membership can deal only in the generalities which have been the mode of past Arab Oil Congresses.

The primary matters slated to come before the full slate of OPEC membership include:

Appointment of alternate governors for each of the member countries so a full board can be expected to attend all future meetings.

Appointment of liaison officers in the capitals of all member nations—Venezuela, Saudi Arabia, Kuwait, Iran, Iraq, and Qatar—to expedite handling matters between OPEC headquarters and member nations.

Studies by OPEC committees on standardization of oil laws and regulations, common accounting methods, and the advisability of a coordinating committee on consumption and marketing of oil may come before the meeting. But as of last week it was not clear whether these studies have been completed.

Membership application of Trinidad is slated to be considered.

IPC issue. The big question which still remained unanswered as OPEC opened its Tehran meeting is whether or not the group will discuss the recent breakdown of talks between Iraq Petroleum Co. and the Iraqi Government over issues which nearly all member countries regard as vital (OGJ, Oct. 23, p. 96).

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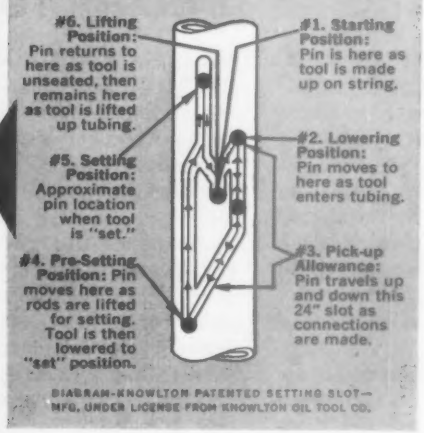
#6. Lifting Position: Pin returns to here as tool is unseated, then remains here as tool is lifted up tubing.
#1. Starting Position: Pin is here as tool is made up on string.
#2. Lowering Position: Pin moves to here as tool enters tubing.
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Representative or not, public statements like this harm the position of the private oil companies when they are not contested. This is undoubtedly the reason the companies were heard from more often at Alexandria than at previous congresses.

2. Tariki's role

In spite of his late arrival, the Saudi Arabian oil minister once again played a leading role at the congress, but with a light touch.

It was pointed out that the paper of Hendryx, his legal advisor, was far less provocative than on previous occasions and Tariki was asked if Hendryx might "be looking for a job with an oil company."

"No," he replied flatly from the rostrum. He added that Hendryx' paper next year won't be a mild one.

The more relaxed air of the meeting was typified by Tariki's own paper. He wanted to stress the desirability of either using or conserving the natural gas that is now being flared in Middle East producing countries.

Speaking English and in a very informal manner that has become familiar, the Saudi oil minister admitted he had been buttonholed by an engineer from Arabian American Oil Co. who had convinced him that vital figures in his paper were incorrect. Undaunted, Tariki contended that wasting gas is criminal. He said he hoped some young engineers would prepare a paper on gas for the next congress, going deeply into the whole question.

Significantly, he said he would like to see the prices of crude oil rise enough to cover the cost of additional reinjection projects to conserve natural gas.

Tariki commented that the Middle East should not be in such a hurry. He said Texas is only producing 8 days a month in order to stabilize prices and added that Middle East countries should prorate production too. If gas produced with the oil can't be used, the oil should not be produced, he said.

3. Fun and games

The only real fun and games at the Alexandria congress were again furnished by Emile Bustani—the "enfant terrible" of previous meetings. He began his campaign at the evening reception the first night with the Italians.

BACKDROP for the speaker's platform at the Arab Congress included the flags of the Arab League and the UAR. Speaker is Dr. Sayed Nofal of Arab League.

In a blow - for - blow argument with ENI delegate, Enrico Bonomi, Bustani attacked the Italians for undercutting Arab oil prices by importing Russian oil. In addition, he complained bitterly that the Italians had not prepared copies of their paper for the delegates to read.

He continued his attack the following day with an onslaught on Dr. Shoucair, the Egyptian professor, for not providing his paper in advance.

The highlight of the final session was Bustani's attack on the Russians for price cutting. Not universally popular with the Arabs, he was criticized privately for his manner and for some of his views, but Bustani carried the crowd with him when he went after the Russians hammer and tongs.

The Russian paper was a dull and unexciting restatement of the now well-known rapid growth of the Russian oil and gas industry. But, it gave Bustani the chance to stand up and wham hard at Russian export policy. His attack caused a debacle in the Russian camp.

V. P. Soukhanov, the Russian speaker, first said through his interpreter that he could not reply to Bustani because the whole question was political. Thinking better of such a stand, a second Russian delegate approached the platform carrying a long statement which has been prepared for use in a later session. Faisal Mazidi, Kuwaiti chairman of the session, refused the second Russian permission to substitute for Soukhanov. The three Russians retreated in angry silence.

The Russians recovered their composure several hours later. They took exception to a Royal Dutch-Shell paper read by G. C. Seaman which outlined the role of international oil companies in marketing the Middle East oil they produce. The paper singled out cheap Russian oil exports as one of the current problems facing marketers.

The Russians replied with a denial that they charge high prices for oil delivered to satellite countries and deliver oil in free-world markets at cut prices.

They insisted that the high prices of oil sold to satellite countries are not high in relation to the prices which Russia pays for other goods from these countries. They are also the same as the prices which Russia pays for oil from certain satellites. The Russians also denied that they undercut oil markets in the free

world. They insisted that Russian oil is sold at prevailing prices.

Handling the same explosive issue, the Italians were far more sophisticated. In a highly diplomatic statement they claimed that their system of partnership with producing countries—which they said is now being emulated by Pan American International and Royal Dutch-Shell—offers the solution to problems of future producer-consumer relationships.

ENI, they said, seeks to supply Italy's oil need by exploration partnerships abroad. While they are waiting for success, ENI is buying oil at the best prices possible—Russian oil.

This ENI contribution drew a brief, to-the-point rejoinder from Salim el Aawar of the Saudi Arabian delegation.

"Anybody who cuts oil prices below Arab oil prices is an enemy of the Arabs," he said.

The administration of the congress and many of those who presented papers were criticized openly this year for failure to make copies available for delegate study in advance of their presentation.

Chisholm of BP joined Bustani in his criticism of speakers who had no translation or who failed to make copies available. The Briton pointed out that the delegates came a long way and said it was impossible to have the kind of discussion the Arabs apparently want if papers are made available at only the last minute.

This prompted a number of discussions and almost barred two Russian, one Italian, and four Venezuelan papers because all arrived late. The heads of the delegations at one time voted against allowing their presentation, but Tariki arrived on the scene and intervened.

Faisal Mazidi, chairman of the economics section, announced the final decision and warned that in future years no late papers will be allowed. This could have a vital impact on future congresses. Mazidi stressed that specious, inadequately prepared papers will be discouraged. Everyone will have a chance to analyze and criticize all future contributions.

The largest number of papers at the Alexandria congress were on technical rather than economic topics.

Over the long pull it is the technical papers which will become the bread and butter of the Arab Oil Congress.

But, for the present, the main concern of the Arab and other producing countries is in the revenue and other benefits they can squeeze out of their fast-growing industries. This is inevitable and it makes the discussion of these questions at the Arab Oil Congress a natural subject of prime importance.

Cities Service moves strongly into Argentina

Company acquires from Loeb, Rhoades a majority interest in the Mendoza area operation, now about half developed and producing 23,000 bbl. daily.

CITIES SERVICE has moved into Argentine crude production with the purchase of a majority interest in L. R. Development Co. from Carl M. Loeb, Rhoades & Co., a New York investment banking firm.

The interest, acquired for an undisclosed amount of Cities Service stock and notes, puts the company squarely into Argentine production with operating control over 23,000 bbl. daily produced under contract with the Argentine Government. There will be no change in the existing management.

Minority partners already in the program are Signal Oil & Gas, with a 20% working interest, and Union Texas Natural Gas Corp., with a 16% interest. The production is from Mendoza, in western Argentina, where drilling began early in February 1959.

What's involved. The first well was completed on March 1, 1959. Since that time 143 wells have been drilled, 128 of them now producing. More than 15 million barrels of oil has been produced from the Mendoza area, and present production is about 10% of Argentina's total output.

The Mendoza contract area consists of about 116,000 acres with three major fields producing. Exploration is continuing. Only one of the fields, with three wells, was proven when the work started.

Production is from about 7,500 ft. from a red conglomerate section of the Triassic. Crude is 31°-32° API gravity.

All production is delivered to Yacimientos Petrolera Fiscales, the Argentine Government company, by pipeline.

The proven area now appears to be about 50% developed. A possible 150 remaining locations may be drilled with two rigs and two well completion units.

Exploration work was carried out in a second contract area in the Province of Santa Cruz during 1959 and 1960. This area covers 1.5 million acres where 19 wells were drilled. Some production was obtained from shallow sands, but the low gravity of the crude and distance from transportation made immediate commercial development uneconomic. No further drilling is planned in this area for the present.

Loeb, Rhoades, made one of the first contracts with the Argentine Government following the election of President Frondizi. This agreement followed 3 years of negotiation which began shortly after the fall from power of Dictator Juan Peron.

Other interests. Cities Service is already involved in two separate ventures in Argentina.

The company has a 24% interest in a $70-million, nine-plant petrochemical complex now under construction. Governmental approval for the big project, owned by five American companies, came early this year after nearly 2 years of negotiation (OGJ, Jan. 23, p. 63).

The second Argentine project in which the company has an interest is a water-flood and exploration operation being conducted by White Eagle International on a 14,000-acre concession held by Argentina Astra, a local company (OGJ, Jan. 30, p. 102).

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Technology

How to complete Ellenburger maximum production

Statistical study of completion methods in 481 wells in 16 fields producing from the Ellenburger formation in West Texas and New Mexico yielded results that may help make your next well a better one.

BY STEVEN GEROLDE
Producers Development Co., Fort Worth

AND H. B. WOFFORD
Producing Properties, Inc., Dallas

OPEN-HOLE COMPLETIONS, completions cased with perforations, completions with acid treatment, and natural completions are all included in this study of wells producing from the Ellenburger formation in West Texas and eastern New Mexico.

Purpose of the study is to provide a guide for future development of Ellenburger reservoirs. Lack of uniformity in the formation, and erratic flow behavior of reservoir fluids affect actual well performance to the extent that theoretical calculations are often useless. For these reasons, a statistical study seemed to be the logical approach.

What was done. Investigations covered 16 fields, 13 in West Texas and 3 in New Mexico. In these fields there have been approximately 564 wells completed and data for 481 were used in this investigation. The field numbers, locations, and other pertinent information are shown in Table 1.

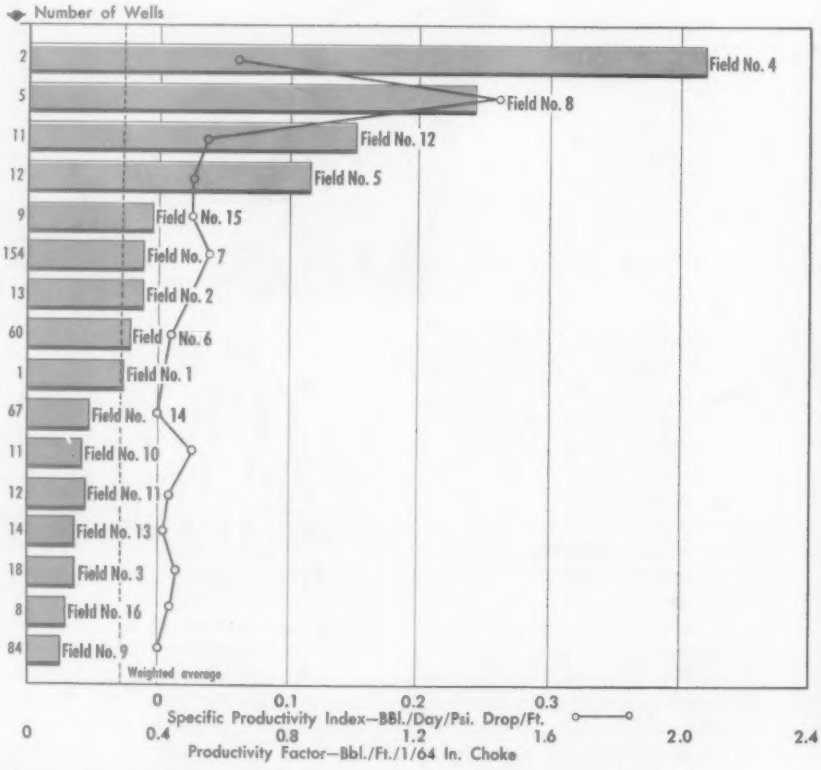
Completion methods were reviewed from the standpoint of oil-producing potential, water production, cap-gas production, and ultimate recovery. In addition, the effects of penetration, or producing-interval thickness, on well performance were investigated.

Geology

The Ellenburger formation is of Lower Ordovician age with physical characteristics of the rock being fairly consistent throughout the West Texas and New Mexico area. From large-core analyses, it has been found that the Ellenburger is a series of dolomites with five different types of porosity: fracture, intercrystalline, intergranular, cavities and solution pores in the ground mass, and cavities in the fracture filling. Average porosity was found to be approximately 2%.

Cavities, solution pores, and fractures are the major contributing factors to the effective producing porosity of the rock, but permeability is affected primarily by the fracture system. Productivity of the formation is thought to depend largely on concentration of fractures near the well bore. Fractures tend to be vertical and continuous throughout the formation from top of pay to below the water-oil contact. In most cases, vertical permeability is equally as good as horizontal permeability.

With the exception of Field 1, the oil zone is in contact with a water table. The productive zone of Field 1 is defined at its base by an impervious section rather than oil-water contact. But this field contained only one producing well and subsequent drilling may show this



PRODUCTIVITY COMPARISON for Ellenburger fields of West Texas and New Mexico, using linear scale for productivity factor. Fig. 1-A.

wells for and life

The authors conclude:

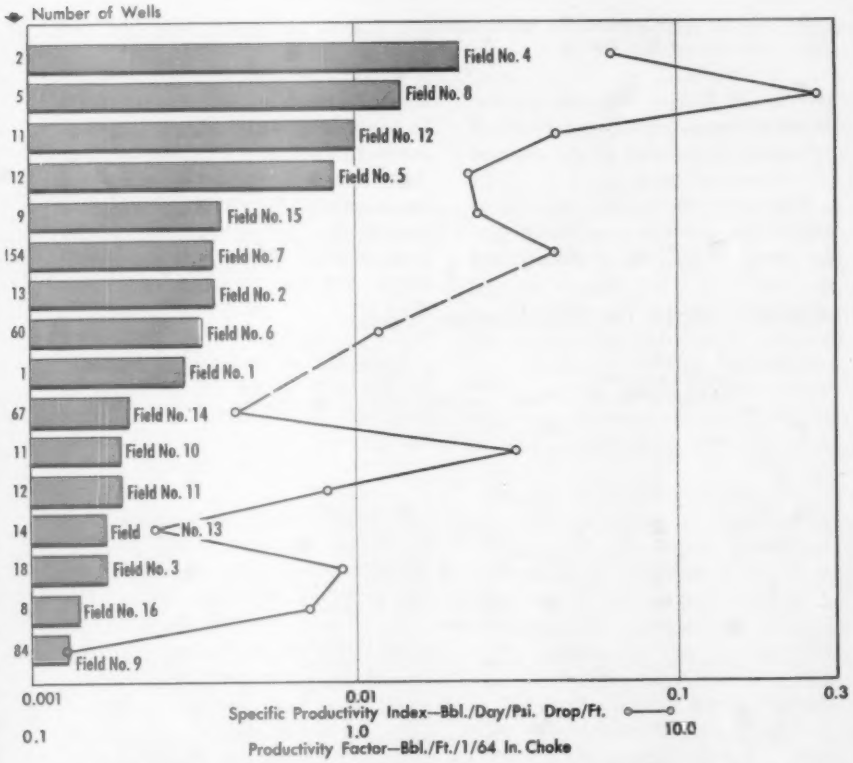
- A casing-perforated completion is more efficient than an open-hole completion for exploiting the Ellenberger formation.
- Depth of formation penetration is not too critical in a casing-perforated completion.
- Casing should be run to total depth and cemented with approximately 10 ft. of cement being left at the bottom of the hole.
- Location of the perforated interval is dependent entirely upon the drive mechanism effective in the reservoir.
- Length of the perforated interval is dependent entirely upon the amount of production needed.
- Use of acid on completion increases or at least restores productivity.

oil zone to be in contact with a water table. Field 7 was the only one in which an original gas cap was present.

Average thickness of oil pay in the fields studied is approximately 338 ft., ranging from an estimated 100 ft. in Field 1 to a maximum average of 489 ft. in Field 9. Average depth to the top of pay is approximately 10,000 ft., or 7,199 ft. subsea, ranging from 4,342 ft. subsea in Field 14 to 10,253 ft. subsea in Field 5.

Fluid Characteristics and Recovery Mechanism

Original bottom-hole pressures ranged from a maximum of 5,834 psi. in Field 5 to 3,081 psi. in Field 14. Fluid analyses show that 14 of the fields were highly undersaturated at original conditions, a good example of this being Field 10 in which the saturation pressure was approximately 4,259 psi. below the original pressure. As stated previously, Field 7 had an original gas cap and was saturated at original conditions. Field 14 was essentially saturated, with the saturation pressure being only 163 psi. less than the original bottom-hole pressure.



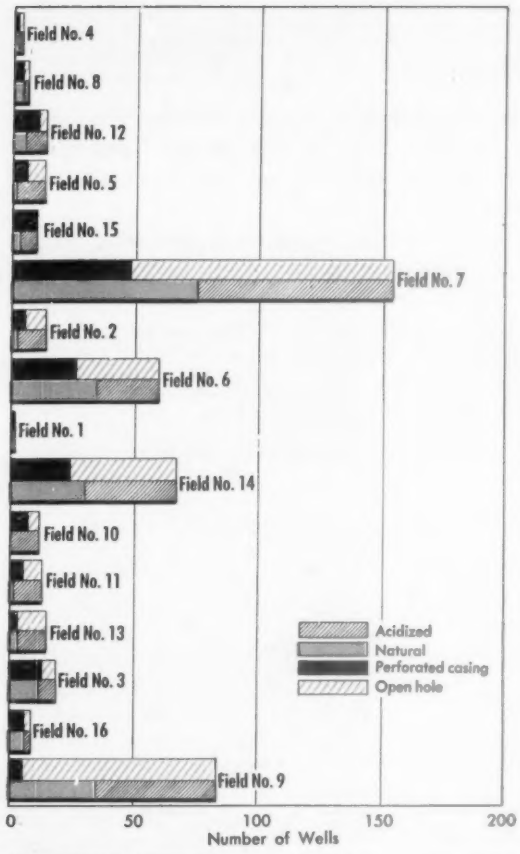
PRODUCTIVITY FACTOR and specific productivity index for Ellenburger fields, West Texas and New Mexico, using logarithmic scale. Fig. 1-B.

Original gas in solution ranges from 286 cu. ft. per bbl. for Field 10 to 2,137 cu. ft. per bbl. for Field 9. It is evident, therefore, that in the early life of Ellenburger fields, oil is produced primarily by fluid expansion. In fact, most fields are still producing above the saturation pressure and under the influence of fluid expansion even though development began several years ago.

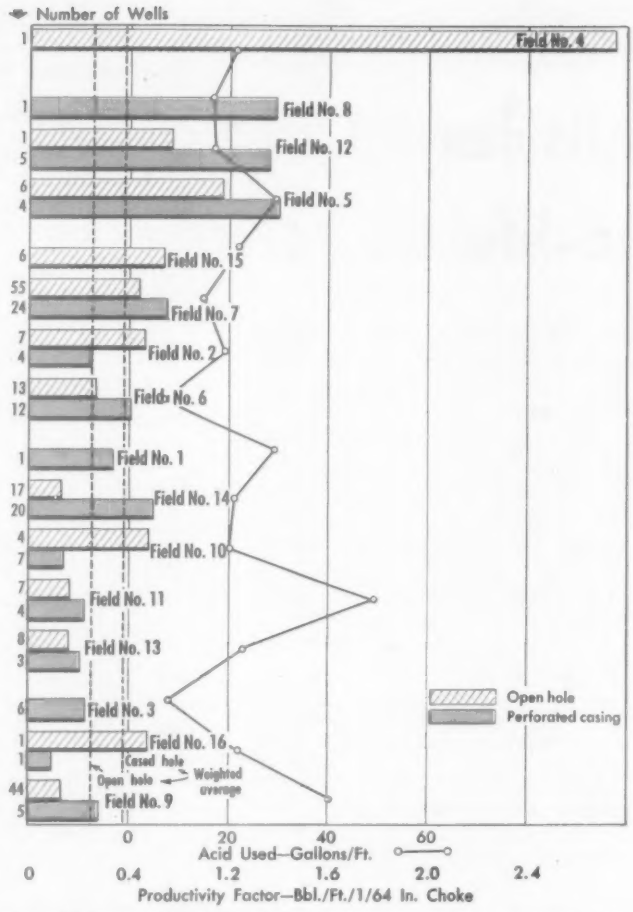
Recovery efficiencies should be high in most of these fields because of active water drives present. Performance data show that 14 of the fields have partial or complete water drives, but in Field 9 and Field 1 no water drive is evident. Field 7 has the most complicated recovery mechanism, since it is producing under the influence of both water drive and gas-cap expansion with the added possibility of a gravity segregation drive. It is conceivable that bottom-hole pressures in some reservoirs may never reach saturation because the water drives tend to maintain pressure.

Basis of Comparison

For the purpose of comparison, productivity of each Ellenburger well was calculated on the basis of initial potential data, excluding those wells which did not flow or which produced large volumes of water or potential. A factor of barrels per day per foot of producing interval per 1/64-in. choke size was calculated for each well, averaged, and plotted in various ways to show relative merit of different completion methods. Productivity-index



COMPLETION METHODS considered for various wells in Ellenburger fields. Fig. 2.



PRODUCTIVITY COMPARISON, Ellenburger wells completed with acid. Fig. 3.

data would possibly have been a better basis, but the number of PI tests was not sufficient to make a complete analysis on individual wells.

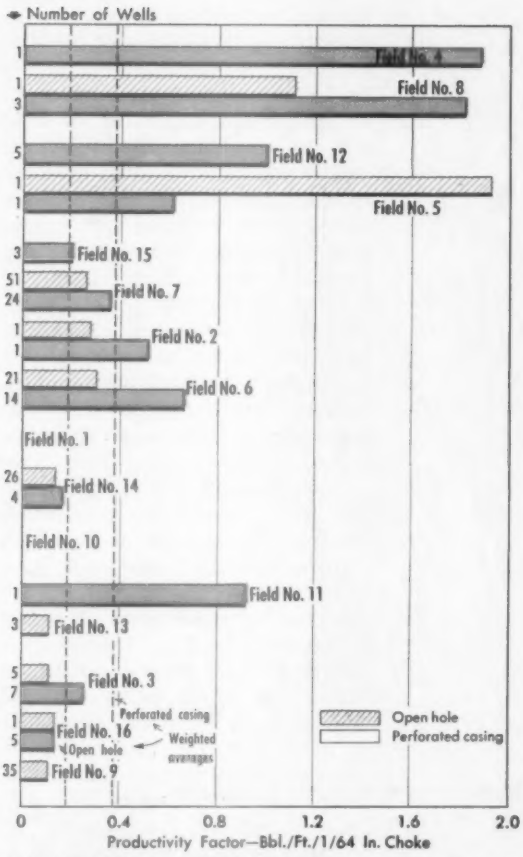
Fig. 1-A shows productivity factor, as defined above, and average specific productivity index for the 16 fields studied. General trend of average PI data is the same as that shown by the productivity factor and indicated the validity of the method of comparison used.

Fig. 1-B shows the same data plotted on a semilog scale so that the trend of PI's is amplified and more distinct.

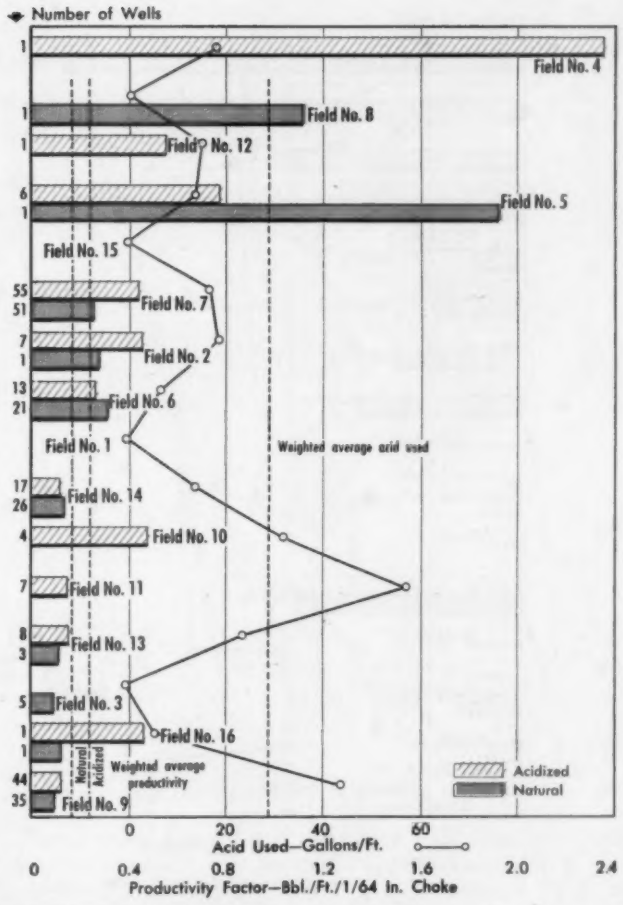
Note that the fields are arranged from top to bottom on Fig. 1-A in decreasing order of average productivity factor with Field 4 having the highest and Field 9 the lowest. This same arrangement is

Table 1—General data for Ellenburger fields

Field No.	Total wells completed at time of study	Total wells analyzed	Avg. specific productivity index—bbl. per day per psi. drop per ft.	Avg. productivity factor—bbl. per ft. 1/64-in. choke
West Texas—				
Field 1	1	1		0.30
Field 2	13	13		0.37
Field 3	20	18	0.0092	0.17
Field 4	2	2	0.0620	2.09
Field 5	12	12	0.0226	0.87
Field 6	60	60	0.0118	0.34
Field 7	154	154	0.0419	0.37
Field 8	5	5	0.2662	1.39
Field 9	90	84	0.0013	0.13
Field 10	11	11	0.0316	0.19
Field 11	14	12	0.0083	0.19
Field 12	11	11	0.0424	1.00
Field 13	14	14	0.0024	0.17
New Mexico—				
Field 14	139	67	0.0043	0.20
Field 15	9	9	0.0242	0.39
Field 16	9	8	0.0073	0.14
Total or weighted average	**564**	**481**		**0.25**



COMPARISON OF PRODUCTIVITY for Ellenburger wells completed naturally. Fig. 4.



PRODUCTIVITY COMPARISONS for Ellenburger wells with open-hole completions. Fig. 5.

used throughout this article for other graphs.

Fig. 2 shows relative number of wells considered in each field, number of wells completed with open-hole and perforated casing, and number of wells acidized and completed naturally. Field 7, containing 154 completed wells, was the largest field studied, while Field 1 with only one well completed, was the smallest. On each of the bar graphs, the number of wells included in each average value of productivity is also posted to show the relative weight of each point.

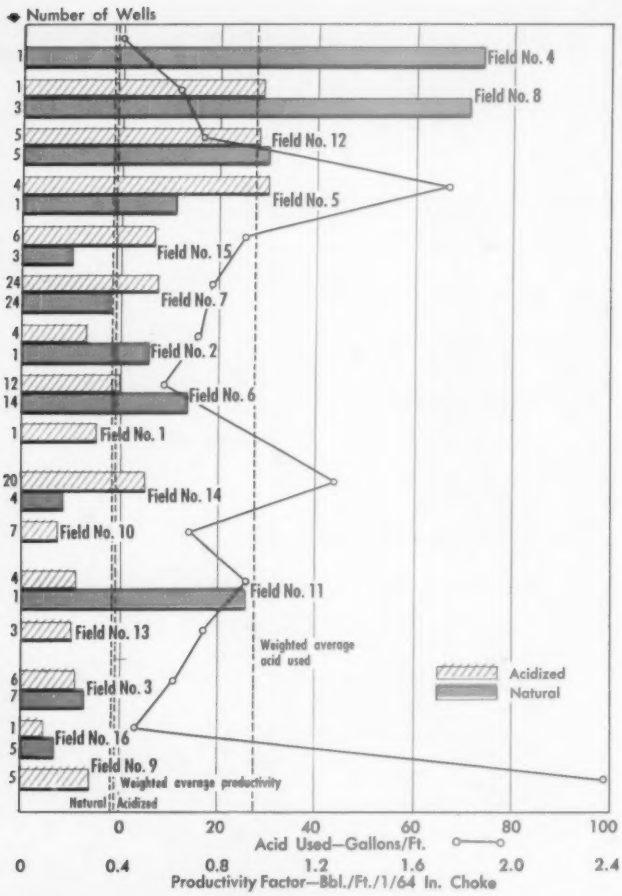
Completion methods. Of the 481 wells examined, 309 were completed open-hole and 172 were completed with casing set into the pay and perforated.

Of the open-hole wells, 164 were acidized and 145 were completed naturally; and of the wells completed with casing perforations, 103 were acidized and 69 were natural completions. The average well was drilled to a depth of approximately 7,199 ft. subsea and completed with 139 ft. of producing interval exposed in a gross oil section of 338 ft. Average initial potential was 1,050 bbl. per day on a 30/64-in. choke with approximately 3,600 gal. of acid being used for the average well completed with acid. Based on initial potential, producing interval, and choke size, the productivity factor for the average well was 0.25 bbl. per day per ft. per 1/64-in. choke, as shown in Figs. 1-A and 1-B.

In the open-hole completions, the oil-zone penetration varied from well to well and followed no definite pattern; casing was set at any point from top of pay to near bottom. In open-hole completions of Field 7, wells penetrating the gas-cap zone were cased to approximately 100 ft. below the gas-oil contact to prevent production of gas-cap gas.

As in the open-hole wells, penetration of the casing-perforated wells was variable with the perforated or producing interval located in no particular part of the oil pay. Some of the wells with the cased hole were perforated through one continuous interval and in some cases incorporated the entire penetrated section while others were perforated in thin intervals with blank sections of pipe between perforated zones. It is probable that in the latter instances casing was perforated opposite the most favorable sections of pay as indicated by electric logs and drill-stem tests on individual wells.

Fig. 3 shows a comparison of the productivity of open-hole and casing-perforated wells which were acidized. Note that the average productivity of 0.38 for perforated completions is higher than that of 0.25 for open-hole completions. Also plotted for each of the fields is the average amount of acid used per foot of exposed producing interval. Although no definite trend is established by this plot, the volume



COMPARISON OF PRODUCTIVITY for Ellenburger wells with casing-perforated completions. Fig. 6.

of acid per foot used in Field 9 and Field 11 completions is much higher than that of the other fields, and productivity factors for these two fields are below average.

Fig. 4 compares the productivity of the two completion methods without acid treatment. In this instance, also, the average productivity of 0.37 for wells completed with casing set into the pay and perforated is higher than the average of 0.18 for those completed in open hole.

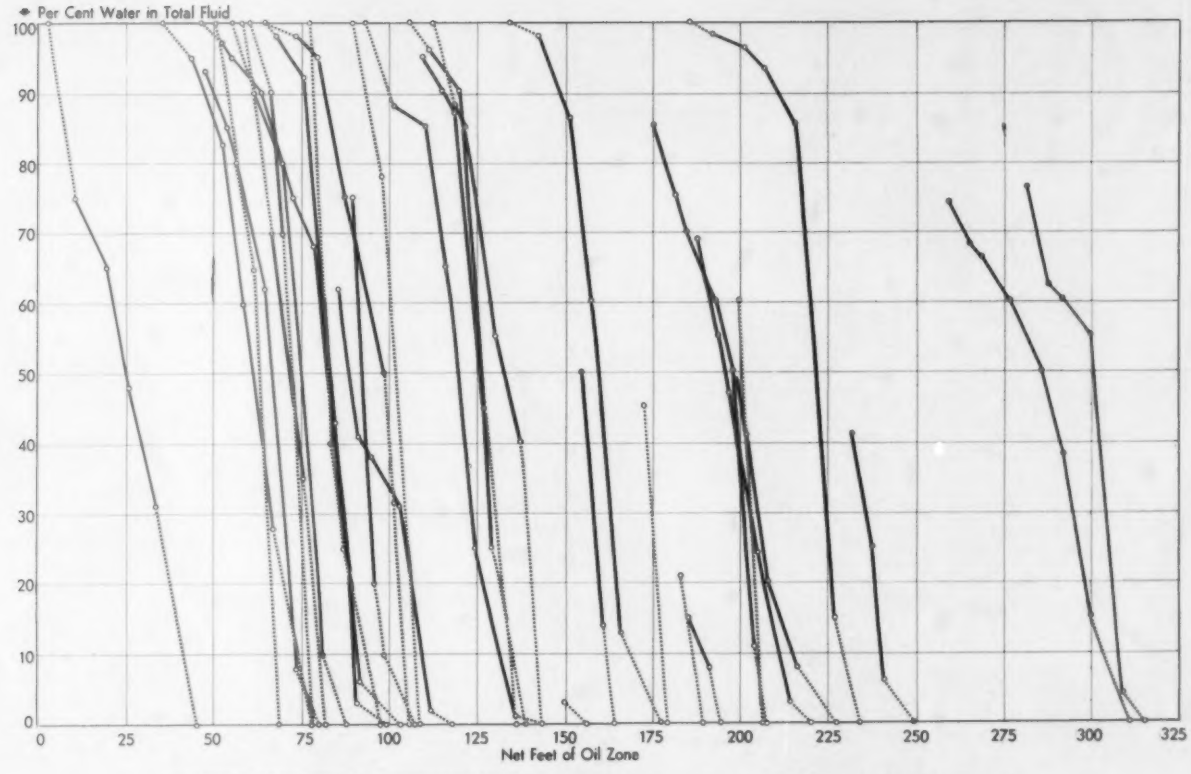
Figs. 5 and 6 are crossplots of the data presented in Figs. 3 and 4. In Figs. 5 and 6, productivity of acidized completions is compared to natural completions, open hole or casing perforated, respectively. Note that average productivity of the acidized wells is greater than that of the wells completed naturally, whether they are completed in open hole or with perforated casing. Average amount of acid used per foot of producing interval is also plotted on Figs. 5 and 6 and the average is greater for open-hole completions than for casing perforated completions.

Water production. This has been a serious problem in most Ellenburger fields since most are underlain by aquifers. Much work has been done in the past, attempting to correlate per cent water production with oil-zone penetration and producing rate, with little success. In Field 13, the depth of penetration and producing rate were found to have no direct bearing on water production. Extensive work on Field 7, using material-balance and water-encroachment calculations, has indicated no relation between penetration and per cent water produced. However, only edge wells have sufficient production history to be of value, and they may not be representative of well performance in the more productive parts of the fields. In Field 12, tests were conducted on a well making water and the per cent water produced was found to be independent of the producing rate. Numerous situations have been observed where offsetting wells completed essentially the same way, at the same depth, and in similar structural positions have exhibited entirely different behavior with respect to water production. And in extreme cases, one well has produced water and the offset well has not. Water-coning calculations have been performed on several wells and no conclusive or reliable results have been obtained.

Workovers performed on individual wells to eliminate excessive water production have been temporarily successful in several fields. But there seems to be a minimum thickness of oil zone above which further remedial work will have little or no success in reducing the per cent water produced. This fact is indicated on Fig. 7, which is a plot of per cent water in total fluid versus net feet of oil zone for 32 wells in Field 7. Net feet of oil zone is defined as the total gross oil zone originally present in the well minus the feet of water encroachment at any time, as calculated by material balance, and based on an average original water-oil contact of 7,150 ft. subsea.

Not all of the wells which produced water in Field 7 are represented on the graph; but, performance is plotted for those wells which have been abandoned due to excessive water production, have been unsuccessfully worked over for water production, or have completion and producing characteristics similar to the wells unsuccessfully worked over. Though the point at which water is first produced varies from 50 to 300 ft. of net pay, the highest concentration of points is between 75 and 150, with average at about 100 ft.

Wells which started making water with apparently as much as 300 ft. of saturated oil zone remaining are thought to be misleading, since the majority of these wells are localized in the southern portion of Field 7. This shows that there has probably been a greater rise of the water table in this area than in the remainder of the field. Disregarding the curves above 125 net ft. and assuming that the plot is representative of most Ellenburger wells. it seems that a water-free completion



WATER-PRODUCTION PERFORMANCE for individual wells in Ellenburger fields. Fig. 7.

at economic rates of production cannot be accomplished with less than an average of 100 ft. of oil-saturated pay, provided of course the oil zone is bordered by an aquifer as is the case in Field 7.

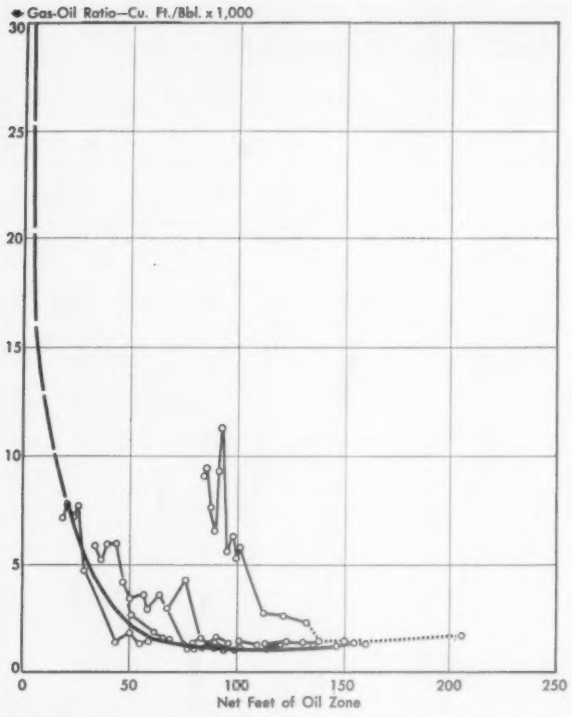
Curves similar to those in Fig. 7 have not been calculated for the other Ellenburger reservoirs, as yet, because material-balance and water-encroachment calculations needed for determining the net feet of oil zone are not available.

Evidently water production is independent of acid treatment in moderate amounts. Of the 32 wells considered in Fig. 7, 16 were acidized on completion and no definite trend of effects is indicated. Use of large volumes of acid could possibly be very detrimental to well performance by enlarging pores and fractures, which could transmit water from the aquifer to the well bore.

Water production is influenced to some extent by the type of completion method used. Of course, wells which are completed near the water-oil contact will produce water sooner than wells completed near top of pay. But completing wells with perforated casing seems to delay the time at which the wells first make water, as compared to open-hole completions. At least some evidence of this has been observed in Field 7 where wells making no water were offset on two sides by wells making water with the only difference in their completions being that the wells making water were open hole; whereas, the offset wells were casing perforated. Actually, the cased wells were completed nearer the original water-oil contact than were the open-hole wells. The effectiveness of casing-perforated completions in prolonging water-free production is probably due to the several feet of cement that are usually left undrilled in the bottom of the hole. It is quite possible that the cement prevents water from invading the well at the bottom, which cannot be avoided in an ordinary open-hole completion.

Gas-cap gas production. Gas production is of little significance in most Ellenburger reservoirs. As mentioned before, Field 7 is the only field in the group studied which has an original gas cap, and dry gas has presented no serious problem except in a localized area near the top of structure where a thin oil section is overlain by the gas cap. However, wells penetrating the dry-gas zone have been completed with casing set approximately 100 ft. below the gas-oil contact. Fig. 8 shows producing gas-oil ratio versus net feet of oil zone for wells in Field 7 which have started producing with excessive ratios. The net feet of oil zone used in this graph is defined in the same manner as it was for the water curves on Fig. 7. As shown on Fig. 8, approximately 50 to 100 ft. of net oil pay remained before the gas-oil ratios began increasing noticeably. It appears unlikely that the prevention of cap-gas production is possible where there is less than 100 ft. of oil pay remaining.

Conditions are favorable in most of the fields for the formation of secondary gas caps due to the excellent vertical permeability and large structural relief that commonly exist. But most of the fields are still undersaturated, so no large volumes of free gas are available to migrate upstructure. Field 14 is suspected of having a secondary cap but this has never been proved conclusively and none of the other Ellenburger fields are exhibiting any unusual performance characteristics which would indicate the presence of a secondary cap.



GAS-OIL RATIO PERFORMANCE of individual wells in gas-cap area, Ellenburger fields. Fig. 8.

Ultimate recovery and well completion. Ultimate recovery for an Ellenburger well seems to be more a function of well spacing and drive mechanism than of well completion except insofar as water production affects recovery. With the excellent permeability afforded by the fracture system together with the flushing action of water drives, a well completed in only the top of pay should recover as much oil ultimately as a well completed throughout the entire section. Actually too few Ellenburger wells are depleted at this time to fully analyze individual well recovery on the basis of completion method.

Conclusions:

Results of this study showed that:

1. A casing-perforated completion is more efficient than an open-hole completion for exploiting the Ellenburger formation. Resulting productivity is greater and water invasion is limited, and casing in the hole is more adaptable to workover operations which can almost certainly be anticipated.

2. Depth of formation penetration is not too critical in a casing-perforated completion. The formation should be drilled sufficiently to obtain representative electric logs, cores, and estimates of gas-oil and water-oil contacts or at least to a penetration of approximately 150 ft., or 50% of the gross oil zone, whichever is the smaller.

3. Casing should be run to total depth and cemented with approximately 10 ft. of cement being left at the bottom of the hole to insure a fluid seal of any fracture connecting the bottom of the hole with the aquifer. Because of the good permeability of the fracture system, the formation should not be subjected to undue pressures during completion.

4. Location of the perforated interval is dependent entirely upon the drive mechanism effective in the reservoir. If the reservoir produces solely by solution-gas drive, the location of perforations is not important. If the oil zone is underlain by an aquifer, it is best to perforate the casing as near the top of pay as possible.

Of course, if an original gas cap is present, along with an aquifer, the perforated interval should be located somewhere between the gas-oil contact and the water-oil contact. Based on data, the proper position of the perforated interval in the latter case is approximately half way between the gas-oil contact and the water-oil contact.

5. Length of the perforated interval is dependent entirely upon the amount of production needed. Allowables of most Ellenburger wells have ranged from 200 to 400 bbl. per scheduled day, so approximately twice this amount on initial potential would probably allow sufficient margin for normal production decline.

Based on the average productivity of an Ellenburger well of 0.25 bbl. per day per foot per 1/64-in. choke and an average choke size of ½-in., a perforated interval of 50 to 100 ft. should give a potential ranging from 400 to 800 bbl. per day.

6. Use of acid on completion increases or at least restores productivity. An acid wash of 500 gal. is recommended but a volume greater than this should be used only if necessary. Except in extreme cases of low productivity, the volume of acid used should probably not exceed 5,000 gal. because of the possibility of enlarging fractures which might conduct water into the well bore.

7. Economics of well-completion methods have not been reviewed for the study because the added cost of setting casing through the pay, perforating and acidizing as compared to open-hole or natural completion is incremental when considering the cost of drilling a well deep enough to exploit the Ellenburger formation.

However, any type completion that will result in efficient oil recovery and at the same time reduce workovers caused by excessive water or gas production will aid appreciably in lowering over-all operating expenses.

Further study of water production from the Ellenburger formation is also necessary but at this time the only solution seems to be complete as far away from the water source as possible and attempt to delay rather than prevent water invasion.

The effects of completion method and water production on ultimate recovery are not fully understood as yet, but as the various fields become further depleted and more data become available a more complete analysis of these factors should be possible.

How to select the right filter element

It's foolish to pay for an element which will filter down to 40 microns when 100-micron filtration is adequate

OIL FILTERS are absolutely necessary on machinery. But you must study carefully the type of service and operating conditions before selecting a filter element.

These conclusions were drawn this month by Paul E. Wieland, of El Paso Natural Gas Co., in a paper presented to a gas-compressor-engine short course at University of Oklahoma.

Wieland said that detergent and nondetergent oils contain various inhibitors and additives to maintain a certain quality throughout the life of the oil. Filter elements not only remove particles, but are also chemically treated to help the operator to maintain quality control over the oil. These elements are capable of keeping the neutralization number down; therefore, rather than change all of the oil in the system when it shows signs of becoming contaminated, continue to filter it. Look to lube-oil analysis as an indicator to "sweeten" the oil, he said. By doing this you get particle removal as well as a clean and uncontaminated oil.

Filter requirements. Wieland pointed out that in judging filter-element and container design, it is necessary first to determine the type of operation the filtration process is to control. That is, detergent, nondetergent, or straight mineral oil and whether the system is bypass or full flow. You should also determine the type of service the oil will be in, such as four-cycle, two-cycle, or gas turbine. With this information you can get the data to help you select a filter.

Wieland said that the essential data are:

1. Rate of flow.
2. Operating temperature.
3. Viscosity of the oil.
4. Line pressure.
5. Maximum allowable pressure drop.
6. Allowable initial pressure drop.
7. Particle-size removal.

Useful life of the element depends to a great extent upon the state and shape of the oil contaminant. Certain shapes tend to sustain porosity while other shapes tend to reduce it. The extended paper element is considered to have relatively good dirt-storage capacity based on the design idea that a large surface area can be compressed into a small space.

Wieland said that El Paso had found the lint-free cotton-waste filter to be satisfactory on gas turbines, with the exception of the flexible coupling, which connects the load compressor to the turbine. On this coupling, which rotates at 5,500 r.p.m., El Paso found that the coupling was acting as a centrifuge, causing particles as small as 2 μ to be packed in and around the geared teeth in the coupling. This caused the coupling to become one which was fixed, rather than one which would "float."

To insure a proper amount of float in the coupling, Wieland said that the firm was now using a pleated element which removes and retains particles down to 2 μ. These paper elements are changed when the pressure differential gets to 10 psi. Cotton-waste filters on the gas turbines are changed about once a year. Downstream of the lubricating-oil storage tank a magnetic filter has been installed to remove iron oxide, steel, and other magnetic material.

Wieland explained that El Paso had made a practice of passing all gas-turbine lubricating oil through a filter press whenever the turbine is down for overhaul, which is after about 30,000 hours of operating time. The oil is filtered into clean barrels, and upon returning it to the lubricating-oil storage tank, the filter paper is changed and the oil "pressed" back into the tank. In this way filter-element life is lengthened.

For two-cycle and four-cycle engines, the cotton waste - filter elements are used on full-flow filters in which the oil is either detergent or nondetergent. On engines which have sidestream or bypass filters and use straight mineral oil, fuller's-earth and cotton-waste filter elements are used.

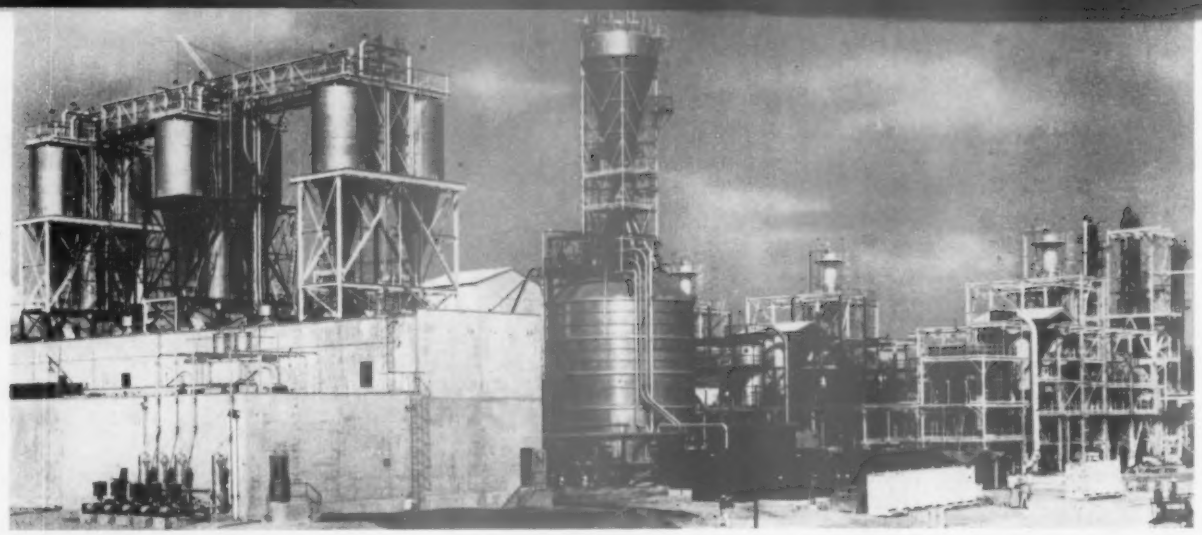
When using an earth filter, Wieland said that it is wise to have a cloth filter downstream to protect against the possibility of earth-filter particles getting to the equipment being lubricated. El Paso had some fuller's earth escape into an oil stream and almost immediately aluminum bearings on the unit being lubricated were ruined.

He cautioned that extreme care should be taken when using diatomaceous earths because they can remove inhibitors and detergents which have been put into the oil for quality-control purposes.

Wieland said that the pleated-paper elements, which El Paso now uses for the flexible coupling on the gas turbine, are to be tested in the near future on the full-flow filter systems on reciprocating engines.

El Paso now changes cotton-waste elements on four-cycle engines at 1,000 to 1,200 hours operating time. Two-cycle engines normally require filter-element changes every 1,200 to 1,500 hours. This is done after making a blotter test and noting the pressure drop across the filter.

The trend in oil filtration is toward removal of smaller and smaller particles. But, Wieland pointed out, it is uneconomical to buy an element which will filter down to 40 μ when the minimum requirements call for 100-μ filtration. By selecting the proper element, you will get maximum flow and keep the element efficiency high.



THIS 100-MILLION-POUND per year plant at New Castle, Del., is a joint venture of Sun Oil Co. and American Viscose Corp.

World's biggest polypropylene plant on stream

RATED as the world's largest, Avisun Corp.'s 100-million-pound per year polypropylene plant at New Castle, Del., was placed on stream in September.

The company, owned jointly by Sun Oil Co. and American Viscose Corp., has been producing the polymer on a continuous basis in a leased plant at nearby Port Reading, N. J., for the past 2 years. The new plant, however, incorporates advances in purification, solvent recovery, and other process steps.

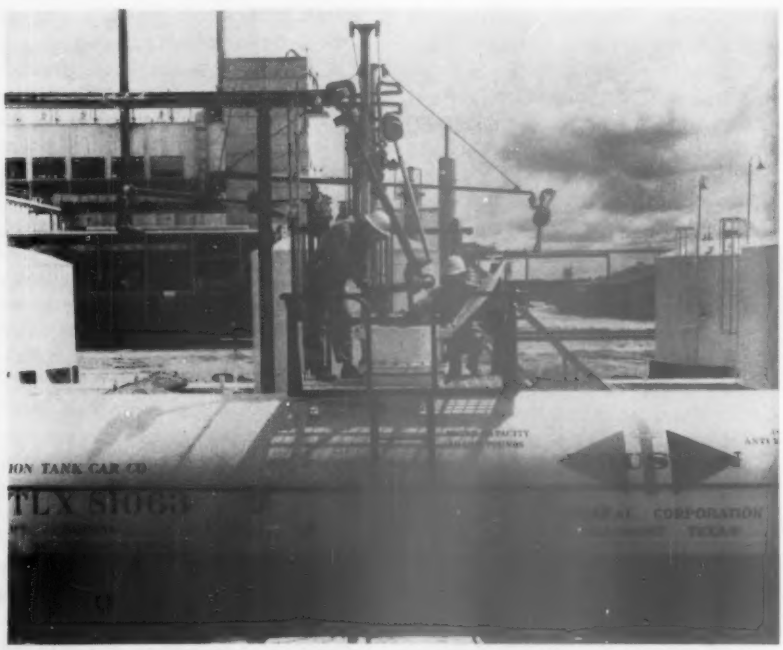
Avisun has released only general information on the unique process being used, developed separately by the two parent companies and Avisun. These data include:

Polymerization takes place with the polymer granules forming around a highly reactive catalyst which has the ability to guide molecular arrangement and structure of the finished product to predetermined specifications.

Purification includes recovering of the catalyst and removing any amorphous product from the crystalline polypropylene, as well as all solvent. Low-density, dry powder is then conveyed to the finishing area where it is compounded into pellets.

Solvent recovery involves removing amorphous powder from the solvent, which is then further purified by fractionation and pumped to storage for reuse.

The polypropylene feed for the new plant is produced in special recovery facilities at Sun's nearby Marcus Hook, Pa., refinery.



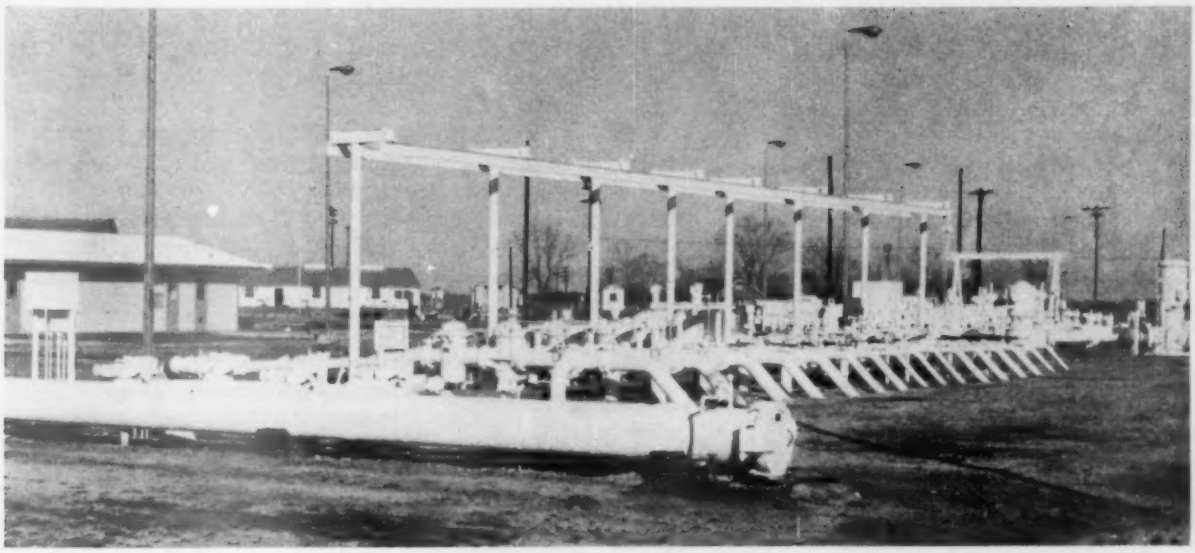
TANK CARS are being filled with TEL to make up the first shipment of Houston Chemical's antiknock additive. Capacity of the Beaumont plant is about 100 million pounds per year.

Houston Chemical now shipping TEL from new Beaumont plant

TETRAETHYL LEAD is now being shipped from Houston Chemical Co.'s new Beaumont, Tex., plant.

With a rated capacity of about 100 million pounds of antiknock compounds annually, the completed plant is some 50% bigger than originally planned. This is in keeping with the company's current sales goal . . . about 15% of the $270 million annual market instead of the original 10%.

Now under construction at the Beaumont chemical complex is an 80-million-pound per year ethylene oxide and ethylene glycol plant. When completed later this year, output of the glycol plant will be sold in bulk for rebranding.



PISTON-TYPE METER PROVER at Satsuma is used to prove 11 positive-displacement meters ranging in size from 3 in. through 10 in. Proving rates vary from 120 bbl. hourly to about 2,500 bbl. hourly. Satsuma is a major station on the Humble Pipe Line system.

Humble's calibrated-pipe meter prover is accurate, fast, and adaptable

Accuracy above 0.02%; run time under 1 minute; remote, automatic control possible; meter complete in itself

BY R. H. PFREHM
Humble Pipe Line Co.
Houston

METERS, as a means of measuring liquids, have been in use for more than 50 years. Today, accuracies of 0.02% are not uncommon, even on measurement of very large and very small quantities of liquid.

In the oil industry—and especially within the pipeline industry—meters are playing an increasingly important role in measuring costly liquids accurately.

The positive-displacement meter is probably the most widely used of all types of meters. Improvements in design and manufacturing know-how, however, are producing turbine-type meters accurate enough to become competitive.

Calibration need. The meter is a mechanical device subject to wear and to variations in operation because of characteristics of the liquid. It must be calibrated periodically to assure its accuracy. A meter is only as accurate as its calibration.

Paper presented at ISA regional conference, Toronto, June 5-9, 1961.

The most widely accepted method of calibrating meters involves a prover tank. Prover-tank volume is established by withdrawing water from the tank and measuring it in cans certified by the U. S. Bureau of Standards. The prover-tank method compares a known volume of liquid to the volume of the same liquid as indicated by the meter register. The comparison establishes the "meter factor." Volumes of liquids subsequently passing through the meter are adjusted by this factor.

Prover tanks are a satisfactory method of calibrating meters and, to a large extent, have been responsible for the acceptance of meters within the oil industry. However, there are certain recognized inaccuracies and limitations in prover tanks.

Variation cause. The meter's rotor or turbine blade is accelerated at the start of each run and decelerated at the end. This causes variation in meter performance. The prover tank must be large enough to make this error less than the maximum tolerance.

Encrustations of deposits on the prover tank's walls also will cause a calibration error. The conditions are more pronounced when heavy-paraffin and asphalt-base crude oils, and low ambient temperatures are encountered.

Liquid temperatures within the prover tank will vary as well as between the prover tank and flowing stream because of the effect of ambient temperature, sun, and wind.

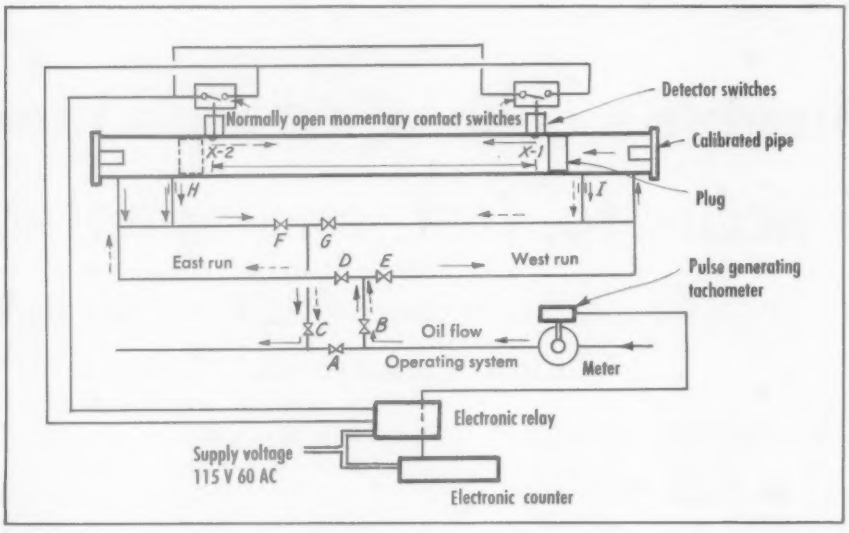
Other problems include: throt-

Advantages of the calibrated pipe prover

1. Meter remains in uninterrupted service at its operating rate and pressure.
2. System may be made completely automatic and adapted to remote operation.
3. System is suitable for multimeter installations.
4. Since system is entirely enclosed, it is adaptable to proving meters at various rates and pressures as permitted by the meter and pipe fittings.
5. Temperature-correction factors may be more accurately applied because the continuous flow of liquid through the calibration system stabilizes the operating temperature of the prover.
6. Error caused by encrustation is eliminated due to the wiping action of the plug against the pipe wall.
7. A complete calibration run can be made in less than 1 minute.
8. Expensive and time-consuming pump-down of the prover tank is eliminated.
9. Cost of calibrated pipe prover system is usually less than a comparable prover tank system.
10. Potential accuracy of the system is somewhat better than 0.02% since errors due to starting the meters are eliminated.
11. Spare meters for calibration purposes only are not needed because of the continuous operation of the motor during calibration.
12. Some characteristics of the fluid, such as vapor pressure, have no effect on this system.

Here's how the calibrated-pipe prover system works

Fig. 1.



A tachometer or pulse generator is driven by the meter and generates 1,000 to 10,000, or any known number, of pulses per unit of volume. Ordinarily, the counter shaft of a meter in pipeline service rotates one revolution per 42-gal. barrel.

Output of the pulse generator is connected to the input of the electronic counter. Pulses are generated throughout the entire proving operation. During normal operation, block valve A is open and the prover system is bypassed by the stream.

Calibration: Open valves E and F, close valves D and G, open valves B and C, and close block valve A. Flow is now in a counterclockwise direction through B and E into the east end of the calibration pipe.

Assuming the plug to be at the east end, it will be displaced by the stream in an east-to-west direction—or what we will call a west run. When the plug reaches a precisely predetermined point, X—1, it actuates the east detector switch. This closes a microswitch which immediately causes the electronic switch to start conducting the pulses from the pulse generator to the electronic counter where they are recorded.

The counter will continue to record pulses until the plug is displaced through the pipe to point X—2 where it actuates the second detector switch, causing the electronic switch to block pulses from the meter to the counter. During the west run, fluid was being displaced through valves F and C back into the operating pipeline system.

This allows continuous uninterrupted flow through the meter and calibration system at all times. When the plug reaches the west end, flow continues through check valve H and valves F and C.

With the plug at the west end of the prover, valves E, F, D, and G are reversed from their position as in the east run. The plug now moves from west to east—or an east run. For the east run, valves D and G would be closed and valves F and E opened.

The electronic counter will then record pulses from the meter between points X—2 and X—1. Upon completion of the east run, the electronic counter will have recorded what the meter measured between detection points X—1 and X—2 and between X—2 and X—1.

tling to maintain proper flow rate and meter-proving pressure when going into a prover tank, and time-consuming pumpdown at the end of the run.

Pipe meter prover. Meter manufacturers within the last few years have been making available larger meters capable of measuring liquids at much higher rates than ever before. Some turbine meters today can measure fluids at rates up to 40,000 bbl. per hour.

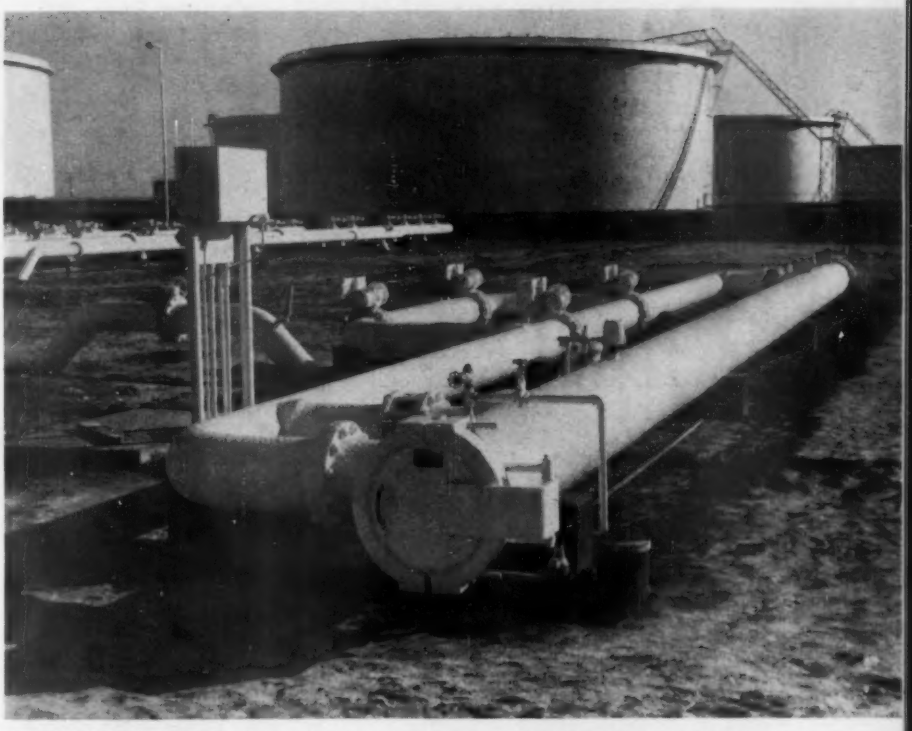
Cost and size of prover tanks to calibrate meters at these high flow rates induced Humble Pipe Line Co. to search for a better method of proving meters. Such a system, the "calibrated-pipe meter prover," has been developed. In its design, Fig. 1, undesirable features of the prover tank have been eliminated without introducing other inaccuracies.

Actual meter calibration is obtained by comparing twice the volume between centers of the detection switches after temperature correction has been made to the volume recorded on the electronic counter. A "round trip" of the plug constitutes a calibration run.

The operation is repeated, making successive runs until the desired repeatability is obtained. Usually, three consecutive runs within 0.05% are required for the determination of a meter factor.

Rigid specs. Construction of the calibrated-pipe meter prover must meet rigid specifications to assure accurate performance. The pipe itself is selected carefully for roundness. When welding on the pipe is completed, all weld beads, burns, sharp edges, and other irregularities which could affect the sealing qualities of the plug are removed. Internal plastic coating of the pipe is recommended to assure a good seal and long life for the rubber cups.

Seal provided by the plug is very important in the operation of the pipe prover. Any leakage will tend to introduce error. It was thought during early work on this prover system that maintaining a good seal would be a major problem. However, experience has shown that the plug is no problem if the prover is constructed and tested carefully. Provers which have seen long service have been recalibrated. No variation in prover volume has been found.



PIPING ARRANGEMENT of the piston-type meter prover at Humble Pipe Line Co.'s Satsuma, Tex., station. This installation uses motor-operated butterfly valves and quick-opening closures at the ends of the 20-in.-diameter 12.5-bbl. prover section.

Round-trip values. Use of the round trip or bidirectional calibration run contributes greatly to the success of a small-volume, high-speed proving system:

1. Any variation in detecting the position of the plug in one direction will be compensated for in the detection of the plug when traveling in the opposite direction.

2. The entire prover can be made shorter, with power volumes much less than those needed for a prover tank.

3. Adjustment of the detection switches is not as critical as it would be in a single-direction system.

Another important consideration is the accurate detection of the plug and the sending of proper pulse information to the electronic counter with the least time lapse. The calibrated-pipe prover system uses a "flip-flop" circuit to conduct or block pulses from the pulse generator to the electronic counter. Successive closures of the detection switches, connected in parallel, perform this function.

The circuit itself is designed to be "sloppy" so that it flips or flops on the first contact of a detection switch and will ignore all subsequent switch bounce. Response time for this circuit is about 18 microseconds.

Absolute volume. Absolute volume probably is the most important point in the use of the calibrated-pipe prover. It can be attained in a number of ways. The most popular methods, and the ones found to be the most accurate, are (1) water drawoff into certified measures as in a prover tank, and (2) use of a master meter.

If the volume of the prover is to be established by water withdrawal into certified test measures, it is best to calibrate before crude oil has been turned into the system. Preliminary preparations of the system, before starting actual calibration, are:

1. Make sure the detector switches are in good working order.

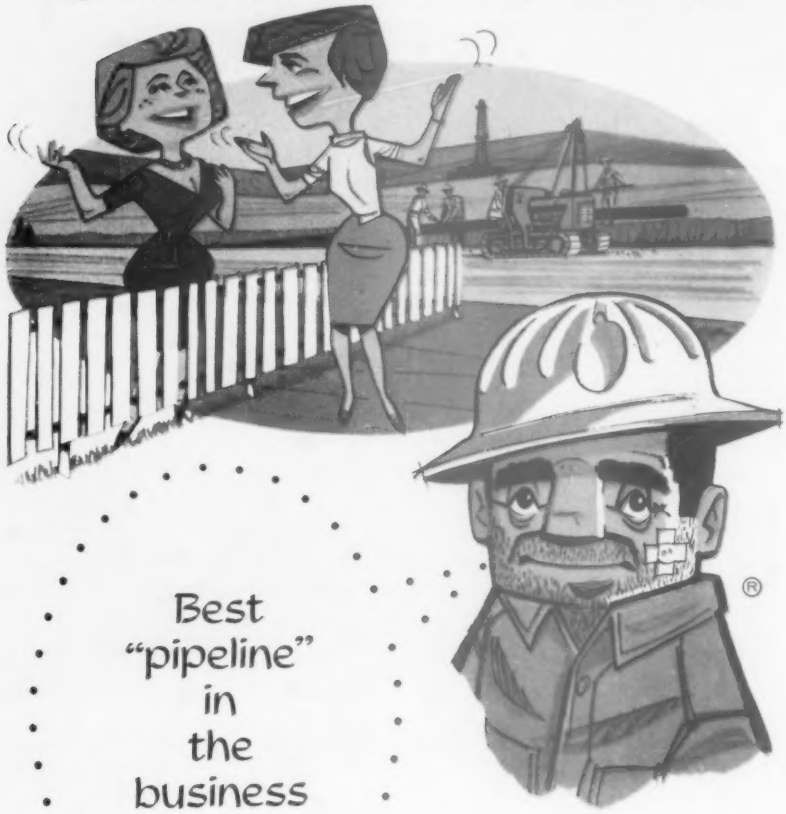
2. Check all thermometers against a certified thermometer.

3. Insulation should be completed before the calibration is started, if the system is to be insulated.

4. Check all valves. Leaky valves make repeatability difficult and give results of questionable accuracy.

5. With the one end of the pipe prover open, displace the plug with

Congrats and $25 for this quip to KENNETH R. TAYLOR, 313 Camellia Avenue, Orange, Texas.



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water on the back side toward the open end and look for leakage around the plug.

The system should be thoroughly purged of air by moving the piston back and forth several times with water. It should be checked for air at bleedoff valves on top of the pipe prover and at water-drawoff points. Avoid any piping arrangement that will trap air.

Proving with water. With prover pipe filled with water and the plug at one end, water is fed into the pipe behind the plug by withdrawing from the opposite end. The plug is moved toward the first detector switch very slowly until first sign of contact is noted, usually by a light actuated by the detector switch. At the first sign of contact the plug is stopped. Certified cans are then arranged to receive water withdrawn during displacement of the prover volume.

Water displaced as the plug is moved toward the second detection switch is measured in the certified cans until the plug reaches the second detection switch. Flow is then stopped and volume computed. The procedure is repeated in the opposite direction to determine the round-trip volume. This is repeated until two consecutive round trip volumes agree within 0.02%.

Use of master meter. Master-meter calibration method is essentially that prescribed in the latest revision of API Code 1101.

First step, according to the code, shall be a complete calibration of the master meter into a conventional seraphin-neck prover tank, using the same grade of liquid as will be used in calibrating the pipe prover.

Calibration of the master meter is done in strict compliance with the requirements outlined in API Code 1101. Calibration of the master meter shall be repeated soon after it has been used to calibrate the prover pipe and the before-and-after performance curves compared to assure that the accuracy of the master meter was consistent.

Second step of the operation is to connect the master meter in series with the pipe prover so that all of the liquid passing through the master meter must also pass through the section of the piston prover which is to be calibrated.

Third step is to direct a portion

of the stream, equal to the quantity which will flow through one meter, through the master meter, thence through the prover section, until the temperature of the master meter and prover pipe reach equilibrium with the normal discharge stream.

This should also be the means by which the master meter, flexible hoses, prover pipe, and connecting piping are completely purged of air or vapor. Flow should be continued until the piston has been moved back and forth enough to assure that its operation is normal. During this conditioning period to equalize temperatures, all valves should be checked for leaks.

Fourth step is to make enough calibration runs at different flow rates to construct a curve plotting volume of prover vs. flow rate. The round-trip volume of the pipe prover does not vary with flow rates. Round-trip volumes determined at different flow rates should agree within 0.02%.

Experience has shown that volumes established by the water-draw vs. master-meter methods check within 0.02%.

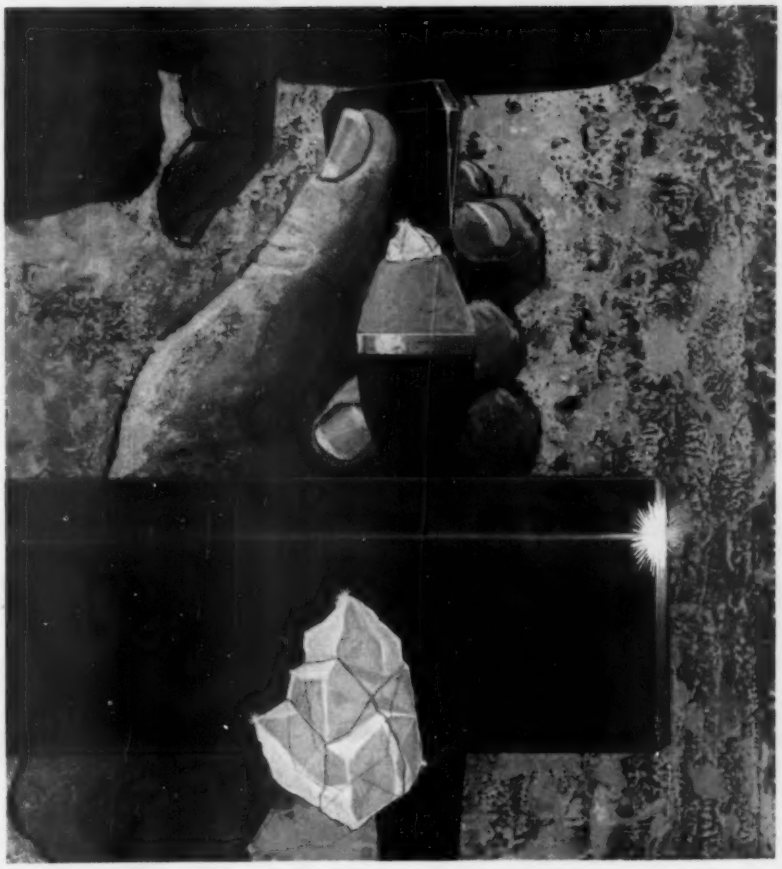
Another method which has been used successfully is to carefully measure the inside diameter of the pipe throughout its calibrated section and calculate the volume between centers of the detection switches. Measurements are usually taken by two people at two different times and compared. If the two volumes determined by the two sets of measurements do not agree within 0.02%, additional measurements are made until they do.

In the November issues:

Journal offers wide variety

The Oil and Gas Journal's weekly coverage of technology-operation will include such timely topics as these next month:

- How automation is licking Argentina's production problems.
- Air-cooled exchangers get the job done, but they pose control problems.
- Electric computers minimize the cost of power in oil pipelines.
- Energy from the expansion of fuel gas generates power at compressor station.



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In diamond cutting, precision craftsmanship is important to preserve the stone and achieve the desired precious beauty. Similarly, in the oil and gas industry .. Lone Star true steel craftsmanship is important in achieving utmost uniform quality in keeping with API standards. Lone Star API pipe is the gem of the industry.

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FOREMAN'S PAGE

This new series shows basics of fractional distillation

HAVING REVIEWED the basics of distillation, let's illustrate distillation from its simple to its more complex method, namely fractionation.

In these illustrations, let us assume that we want to separate the hexane from a 20% hexane (C_6), 80% heptane (C_7) mixture.

Multiple-unit simple distillation. Fig. 1 illustrates simple distillation using a number of stills in series.

In Fig. 1, the first still increases C_6 purity from 20 to 25%; the second increases purity from 25 to 42%; the third boosts purity from 42 to 58%; the fourth from 58 to 75%; and the last still increases C_6 purity from 75 to 88%.

Note the temperatures held on each still. What would happen if the stills had been run at higher temperatures? Both the liquid and vapor composition in each still would be different at higher temperatures. Thus, the bottoms liquid from each still would contain less C_6, and the vapors would contain more C_7. The overhead yield from Still No. 5 would be greater, but it would contain more C_7. In other words, the yield of overhead product would be greater, but it would be of poorer quality.

Strange as it may seem, the degree of separation in this type of operation improves with decreasing yield.

Looking at the final product, we see that its maximum purity is 88%. This is excellent for this type of distillation. However, the amount of product is extremely low. Note that only the distillate (or condensate) purity is improved because no stills have been provided below the feed still.

Multiple-unit fractional distillation. Let us examine in Fig. 2 a more efficient method of making the same separation between C_6 and C_7. This is fractional distillation using a number of stills in series. The main difference between this operation and simple distillation is that the liquid condensate from each still is returned to the next lower still.

As the feed is partially vaporized in No. 1 still, the vapors rise up the still and come in contact with liquid in No. 2 still. As the temperature of the liquid in the still is lower than that of the rising vapors, partial condensation of the vapors occurs. At the same time, liquid from No. 2 still is returned to the No. 1 still near its top. Therefore, as vapors rise in No. 1 still, they meet the returning liquid from No. 2 still. Latent heat is removed from the rising vapors, causing two things:

1. Vaporization of the lower-boiling materials from the liquid (C_6 in this case) being returned from the No. 2 still.

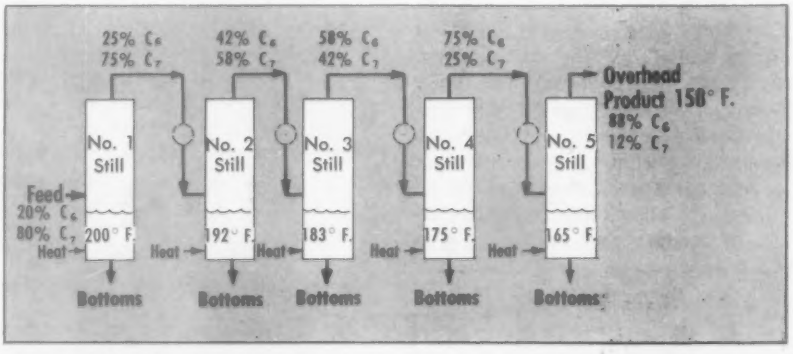
2. Condensation of the higher-boiling materials in the vapor (C_7 in this case) rising from the No. 1 still.

The same vaporization and condensation actions are also taking place in the other stills. In other words, revaporization and recondensation are occurring within the tower. As a result, this type of distillation is better than a simple distillation for the following reasons:

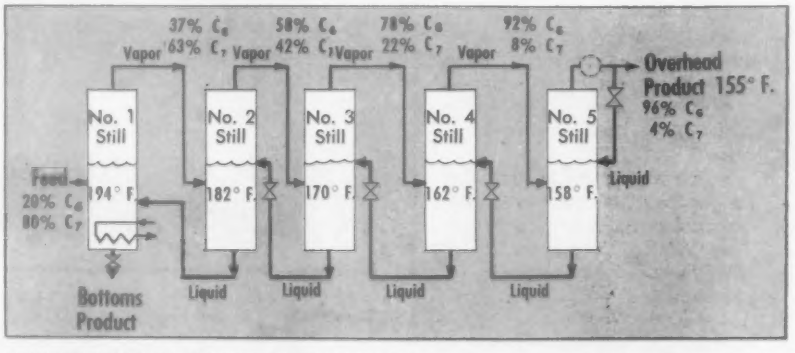
- The yield is increased, since only the bottoms from the first still are removed.
- A large heat economy is realized by using the vapors from the preceding still to boil the liquid in the following still.
- A higher-purity product is obtained.

Another feature of this type of distillation is that it is possible to obtain a nearly pure bottoms product (heptane in this case) merely by using additional stills below the feed still.

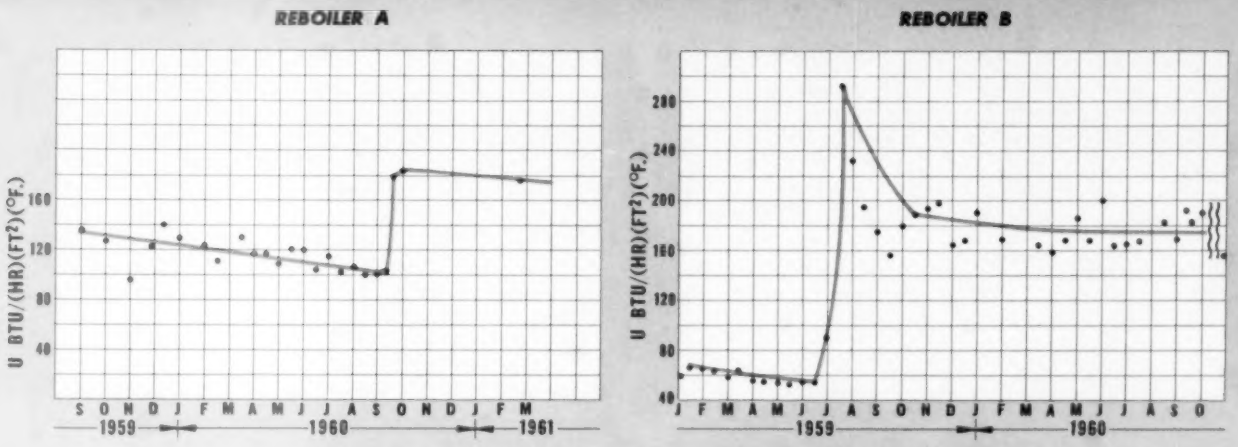
The more condensate that is returned to the stills, the better will be the separation. Therefore, maximum separation is achieved when all the condensate is allowed to flow back into the stills. Believe it or not, it is the process of returning condensate back into the system that converts simple distillation into fractional distillation and provides us with a higher efficiency and a large increase in yield.



MULTIPLE-UNIT SIMPLE DISTILLATION simply uses a number of stills in series to increase the overhead product purity. Fig. 1.

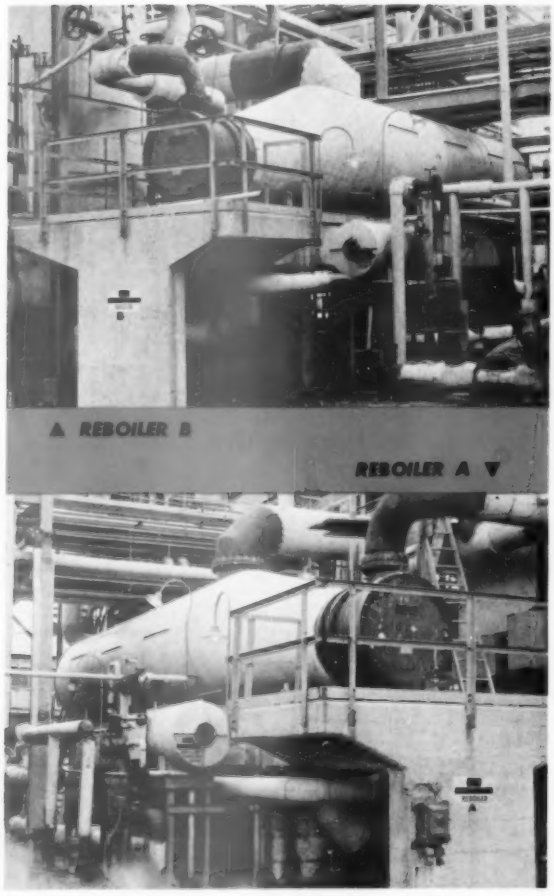


MULTIPLE-UNIT FRACTIONAL DISTILLATION uses a number of stills in series, but the liquid condensate from each still is returned to the preceding still. Fig. 2.



FRACTIONATING TOWER REBOILER COEFFICIENTS

Wolverine Trufin® Type S/T helps Sun Oil boost reboiler capacity



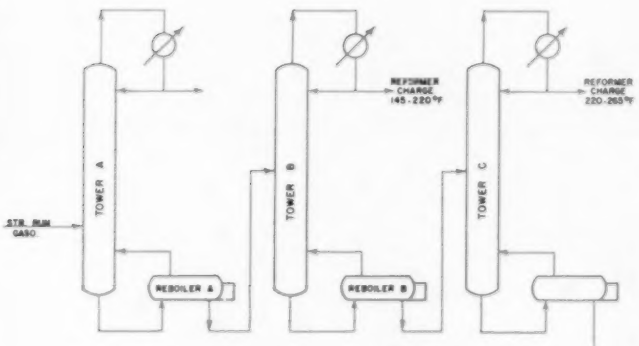
How Wolverine Trufin Type S/T–the integrally finned heat exchanger tube–boosts both tube surface area and heat transfer capacity is graphically shown by a recent Trufin installation at Sun Oil's Marcus Hook refinery.

In this application–preparing reformer feed stocks–two reboilers, tubed with bare tubes on triangular pitch, were retubed on a square pitch with Trufin Type S/T low carbon steel tubes in U-bend form.

Surface area in each unit jumped from 4400 to more than 9000 square feet. Following its retubing with 486 Trufin U-bends in June, 1959, the calculated overall coefficient of heat transfer in Reboiler B rose from a level of 60 on the bare tubes to 290 on the Trufin tubes and then, with normal fouling, leveled off at approximately 180–a threefold increase.

In the case of Reboiler A, which was retubed in September, 1960, with similar Trufin Type S/T U-bends, the calculated heat transfer coefficient rose from approximately 100 on the bare tubes to 180 on the Trufin tubes where it also leveled off.

Operations such as this, where excessive fouling on the outside of the tubes is normally encountered can, in many cases, be given a substantial performance boost through the use of Wolverine Trufin Type S/T. Why not get the Trufin story before retubing? Just ask your Wolverine salesman–HE KNOWS. Write, too, for a copy of the Trufin Catalog.



PREPARATION OF REFORMING CHARGE STOCKS

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PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA
SALES OFFICES IN PRINCIPAL CITIES

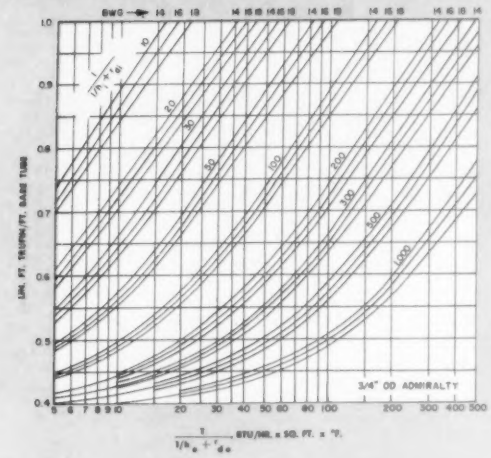

FIG. 4

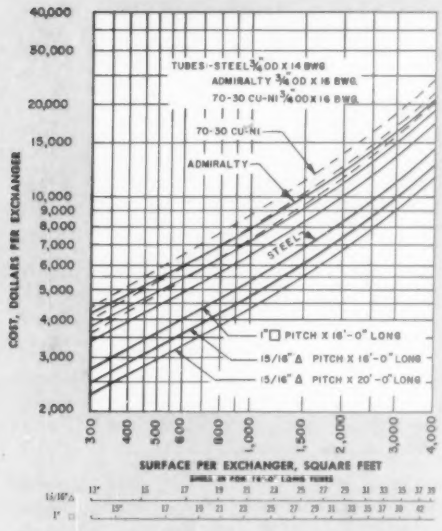
TUBES - STEEL 3/4" OD X 14 BWG
ADMIRALTY 3/4" OD X 16 BWG
70-30 CU-NI 3/4" OD X 16 BWG
70-30 CU-NI
ADMIRALTY
STEEL
1" □ PITCH X 16'-0" LONG
15/16" △ PITCH X 16'-0" LONG
15/16" △ PITCH X 20'-0" LONG
COST, DOLLARS PER EXCHANGER
SURFACE PER EXCHANGER, SQUARE FEET

FIG. 8

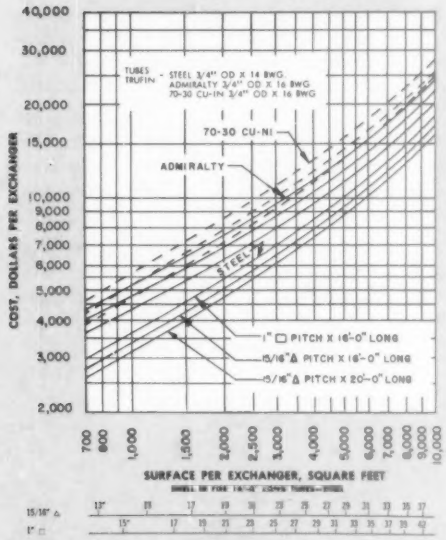
TUBES - STEEL 3/4" OD X 14 BWG.
ADMIRALTY 3/4" OD X 16 BWG.
70-30 CU-NI 3/4" OD X 16 BWG.
TRUFIN
70-30 CU-NI
ADMIRALTY
STEEL
1" □ PITCH X 16'-0" LONG
15/16" △ PITCH X 16'-0" LONG
15/16" △ PITCH X 20'-0" LONG
COST, DOLLARS PER EXCHANGER
SURFACE PER EXCHANGER, SQUARE FEET

FIG. 10

Rate it for yourself!

Here's a "DO-IT-YOURSELF" test designed exclusively for technical people engaged in heat transfer operations. By using the technical data on this page, you can quickly make a comparison test that will show you the actual savings you can achieve by retubing bare-tubed heat transfer units with Wolverine Trufin® Type S/T—the integrally finned heat exchanger tube.

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ADMIRALTY TRUFIN

For a given service the calculated bare tube cooler contains 3100 sq. ft. in a 39" ID shell. Tubes are ¾" OD x 16 BWG x 16'0" long admiralty on 1" square pitch. The shell side coefficient and fouling factor were 150 and 0.002 respectively. The tube side coefficient and fouling factor for the water were 1000 and 0.001.

From *Fig. 8*, Cost=$16,400.

Refer now to *Fig. 4*

$$\frac{1}{1/h_o + r_{do}} = \frac{1}{1/150 + 0.002} = 115.5 \text{ Btu/hr x sq. ft. x °F}$$

$$\frac{1}{1/h_i + r_{di}} = \frac{1}{1/1000 + 0.001} = 500 \text{ Btu/hr x sq. ft. x °F}$$

From *Fig. 4*, 0.59 lin. ft. of Trufin are required per foot of bare tube. There are 0.1963 sq. ft./lin. ft. of ¾" OD bare tube.

From *Table 2*, there are 0.496 sq. ft./lin. ft. of ¾" OD Admiralty Trufin.

Trufin exchanger required=3100 x $\frac{0.496}{0.1963}$ x 0.59= 4610 sq. ft.

From *Fig. 10*, nearest full shell 31" ID.

Surface = 4690 sq. ft.

Cost = $13,000.

Saving = $16,400 − $13,000 = $3,400.

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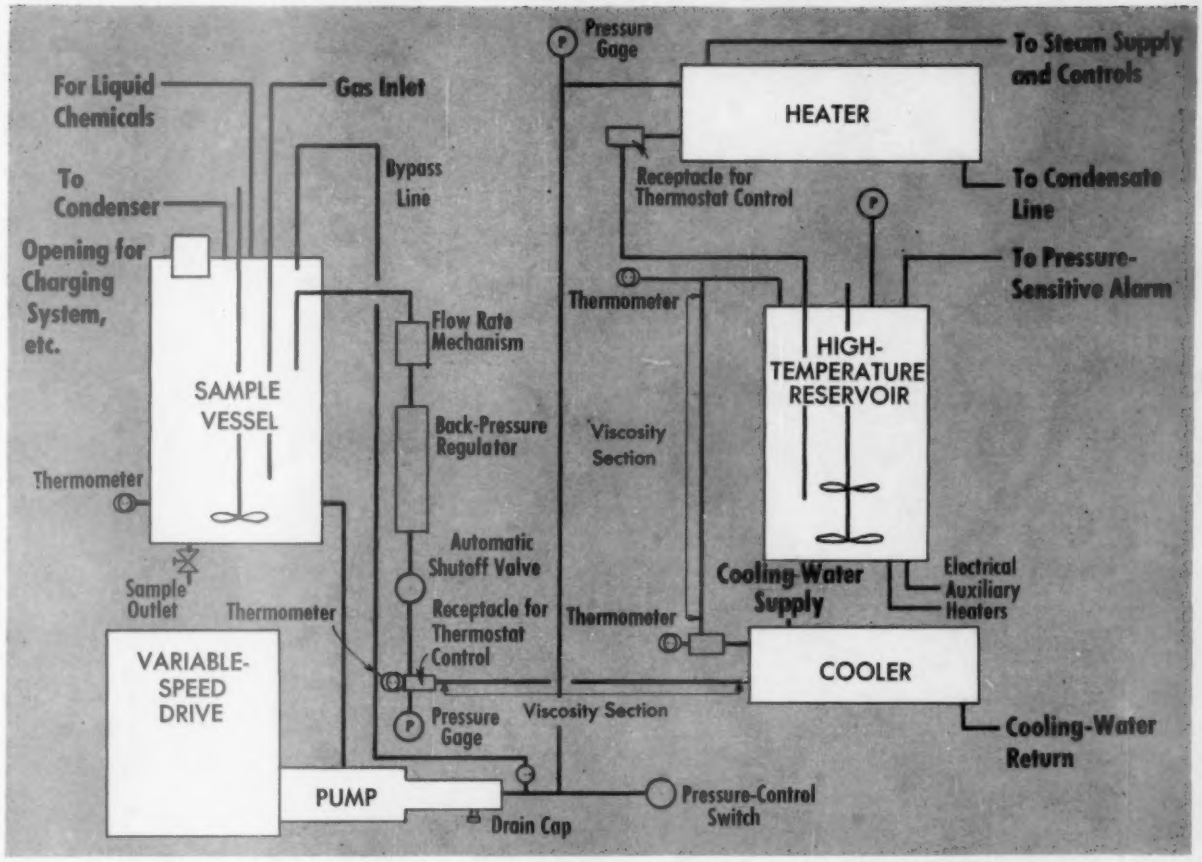
TABLE II

	NOMINAL SIZE		PLAIN SECTION DIMENSIONS		FINNED SECTION DIMENSIONS			OUTSIDE AREA	SURFACE AREA RATIO	I.D. CROSS SECTIONAL AREA
	O.D.	CATALOG NO.	O.D.	Wall Thk.	Root Dia.	Wall Thk.	Inside Dia.	Sq. Ft. per Linear Ft.	ao/ai	In Sq. Inches
19 FINS PER INCH	3/4	60-195028	.750	.049	.625	.028	.569	.496	3.33	.254
		60-195035		.049		.035	.555		3.41	.242
		60-195042		.058		.042	.541		3.50	.230
		60-195049		.065		.049	.527		3.60	.218
		60-195065		.083		.065	.495		3.84	.192
		60-195083		.095		.083	.459		4.13	.166



MID-CIRCULATING SYSTEM simulates the heating, cooling, and aeration cycle that a drilling fluid encounters in an actual well. Older batch method was unsatisfactory even though it could more easily put mud under high pressures.

High-temperature mud study to throw light on performance of

Mud additives in deep wells

BY JOHN KELLY, JR., AND DANIEL E. HAWK
Socony Mobil Oil Co., Inc., Field Research Laboratory, Dallas

MUD ENGINEERS have long suspected that some mud materials are not equal to the severe tests put to them by deep-well drilling. Additives which control water loss are thought to degrade in the deep hot wells. Thinners seemingly fail to prevent viscosity, gel, and yield strength from climbing. Some muds appear to be quite corrosive.

Until now, there has been no ready way to check these conditions. It is for this reason that the field-research laboratory of Socony Mobil Oil Co. has constructed a new circulating unit so that drilling mud can be studied at high temperatures. The new unit simulates the heating, cooling, and aeration cycles actually encountered in the field mud.

Socony Mobil feels that the new circulating unit is superior to the old batch-test procedure. The batch test does not permit close observation of mud conditions nor does it allow continuous treatment of the mud during testing. Moreover, frequent measurements of mud properties cannot be made in batch tests without a large number of individual samples or without continuously interrupting the aging process of a large sample. All these things are possible with the circulating test unit.

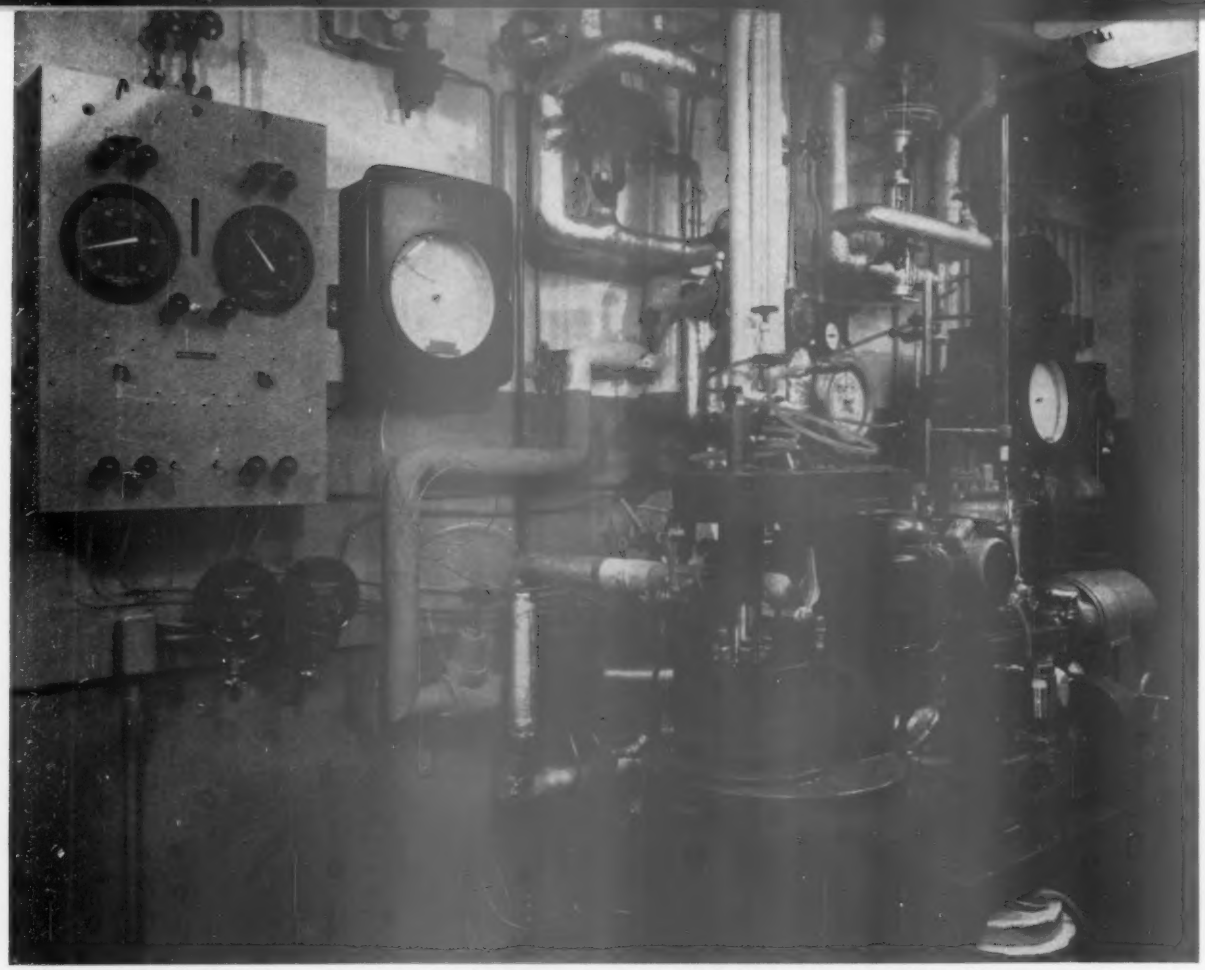
Duplicating the well. Design of the new unit simulates some of the most important conditions of the field circulation of a drilling mud:

1. Conditions in surface treating and handling.
2. Conditions associated with temperature increase as the mud is circulated down the hole.

No attempt has been made thus far to reproduce bottom-hole pressures. Soon, however, a high-temperature, high-pressure filtration cell is to be added.

The sample vessel is made of lucite and is laid out to be analogous to conditions in the surface equipment of the mud system. It includes:

1. An inlet through which a gas (air, nitrogen, or oxygen) can be introduced. Purpose is to simulate the aeration a mud receives in flowing over the shale shaker and through the ditches and pits.
2. A stirrer which represents the



LABORATORY EQUIPMENT has at least three advantages: It permits close observation of mud conditions, it allows continuous treatment of the mud, and mud properties can be measured often without interrupting the circulating process.

mud guns and other stirring equipmen.

3. Openings to allow chemical treatment of the mud while it is flowing.

4. A thermometer to check surface temperature of the mud.

5. A condenser to prevent loss of water from the system.

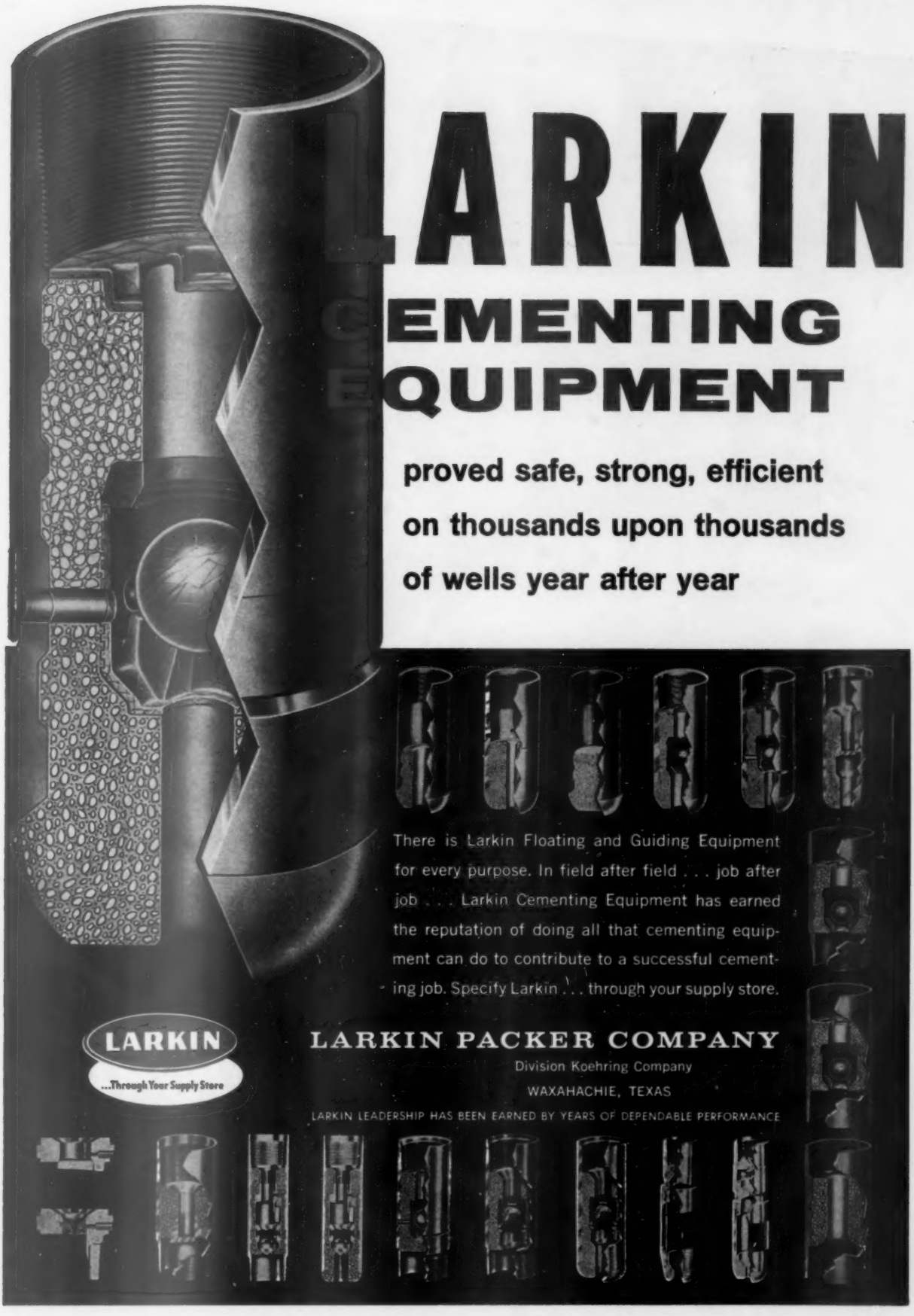
6. A sample outlet which permits periodic checks of mud properties. A cooler on this outlet cools the mud from "flow-line temperature" to room temperature. Cooling the samples to 80° F. provides a standard temperature at which all properties may be measured and referred.

Near the bottom of the sample vessel, there are two openings which have lines connecting them to the "mud pump." One opening has a stainless steel (316 type) screen which projects out into the sample

Table 1—Effect of high temperatures on mud properties

Sample Number	Mud Properties† Plastic Visc. (cp.)	Yield Point (lb./100 ft.)	Initial Gel (lb./100 ft.)	Density, (lb./gal.)	T_1 (°F.)	T_2 (°F.)	Flow Rate, q (gal./minute)	P (psia.)	T_s (°F.)	U‡
1*	50	20	2	14.05	121	293	0.760	75	308	206
2*	32	20	3.5	14.05	122	293	0.921	82	314	217
3*	20	18	10	14.07	121	293	0.919	84	315	214
4*	14.5	24.5	12.5	14.01	121	293	0.925	83	315	214
5*	14	25.5	14	14.03	122	293	0.934	85	316	212
6*	24	13	3.5	14.00	121	317	0.925	105	331	266
7*	13	20	10.5	14.03	120	317	0.930	125	344	210
8*	12	25	15	14.00	120	317	0.925	136	351	188
9*	11	35	19	14.00	120	317	0.925	137	351	188
10*	23	8	1	14.00	122	343	0.927	137	351	330
11*	16	10	5.5	13.99	121	343	0.930	142	354	301
12*	13	17	9	14.00	120	343	0.925	169	368	225
13*	12	19	12	14.00	121	343	0.925	181	373.5	208
14*	12	23	13.5	14.00	120	343	0.792	179	373	179
15*	11	32	19	14.00	120	343	0.616	182	374	138
16	11.5	25.5	16.5	14.04	119	300	0.925	115	338	173
17	10	20	12	14.12	120	301	0.914	97	326	207
18	10	24	15	14.05	120	300	0.914	112	336	175
19	11	25	17	14.05	120	300	0.933	115	338	174

*Base mud containing CMC; samples without asterisk are base mud only. †All properties measured at 80° F. using Fann Multispeed Viscometer (Model 35) and Baroid Mud Balance. ‡Units for U are B.t.u. per hour-°F.-ft.²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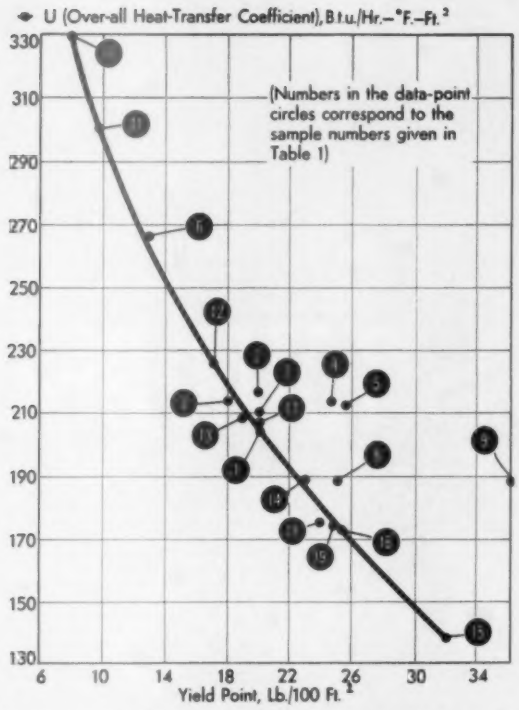


YIELD POINT OF MUD is variable on which over-all heat-transfer coefficient most depends. Yield-point values here were extrapolated from two-point measurements from Fann viscometer.

vessel and has much larger screening area than the diameter of the outlet. Purpose of the screen is to prevent large particles of freshly added materials from being pumped into the system and plugging small tubing or increasing erosion of stator and rotor in the pump.

The other line from the sample vessel to the mud pump is pinched off. Thus the mud under normal circulating conditions is forced to flow through the screened line. If the screen becomes plugged and there is too little flow through the pump, the pinched line is opened and fluid moves through it into the pump. This prevents pump from becoming overheated, and also helps maintain circulation through the system.

The mud pump is a screw type with a buna-N-lined steel stator and a chrome-plated tool steel rotor. It is powered by a 1-hp., variable-speed unit driving through a 3-to-1 reduction pulley system. This provides the 78 to 390 r.p.m. required for the system.

From the outlet of the pump, a bypass line connects through a control valve to the sample vessel. This bypass allows a large amount of fluid to circulate through the pump when the flow rate through the circulating unit is low. As a result, the pump does not overheat nor wear excessively. The bypass also extends the range of pump speed and pressure when the mud is viscous.

Down the well. From the pump the mud goes down the "well" and is heated. In the line leading from the pump to the heater are two taps—one connected to a pressure gage and the other to a pressure switch. The gage is a continuous monitor of pump pressure when the unit is in use. The switch shuts down the entire unit, including pump, heating system, and shutoff valves, in case of excess pump pressure.

The heater is a heat exchanger consisting of a mild-steel cylinder 50 in. long and 6½ in. in diameter. It contains 16 passes (single tube per pass) of ⅜-in o.d. by 0.035-wall Monel tubing. On the tubing loops, the 180° bends may be disconnected from the straight runs. This permits easy removal of the tubes for cleaning or replacement.

Saturated steam at 180 psi. heats the fluid as it circulates through tubes of the exchanger. Steam supply is controlled by a pneumatic, temperature-recording controller which operates a diaphragm connected to a parabolic needle valve. For more accurate and sensitive temperature control, the steam pressure to this control valve is in turn regulated by a pneumatic steam-control valve at the steam source. With this system of control, temperature of the drilling fluid circulated through the system may be controlled from 200° to 350° F. with variation of plus or minus 1°.

From the heater, mud flows into a high-temperature reservoir. This reservoir is included in the system to exaggerate the time the mud remains in the high-temperature zone during circulation. The reservoir consists of a modified, 1-gal. autoclave. Electrical heat at the autoclave maintains temperature of the mud at the value at which it came from the heat exchanger.

Taps on this reservoir lead to a pressure gage and a pressure switch. The gage in giving pressure inside the reservoir, tells at a glance if operating pressure is greater than vapor pressure of the fluid. When pressure inside the reservoir drops within 10 psi. of the vapor pressure of the fluid, the pressure switch shuts off steam supply at the control valve. At the same time the switch also causes the following:

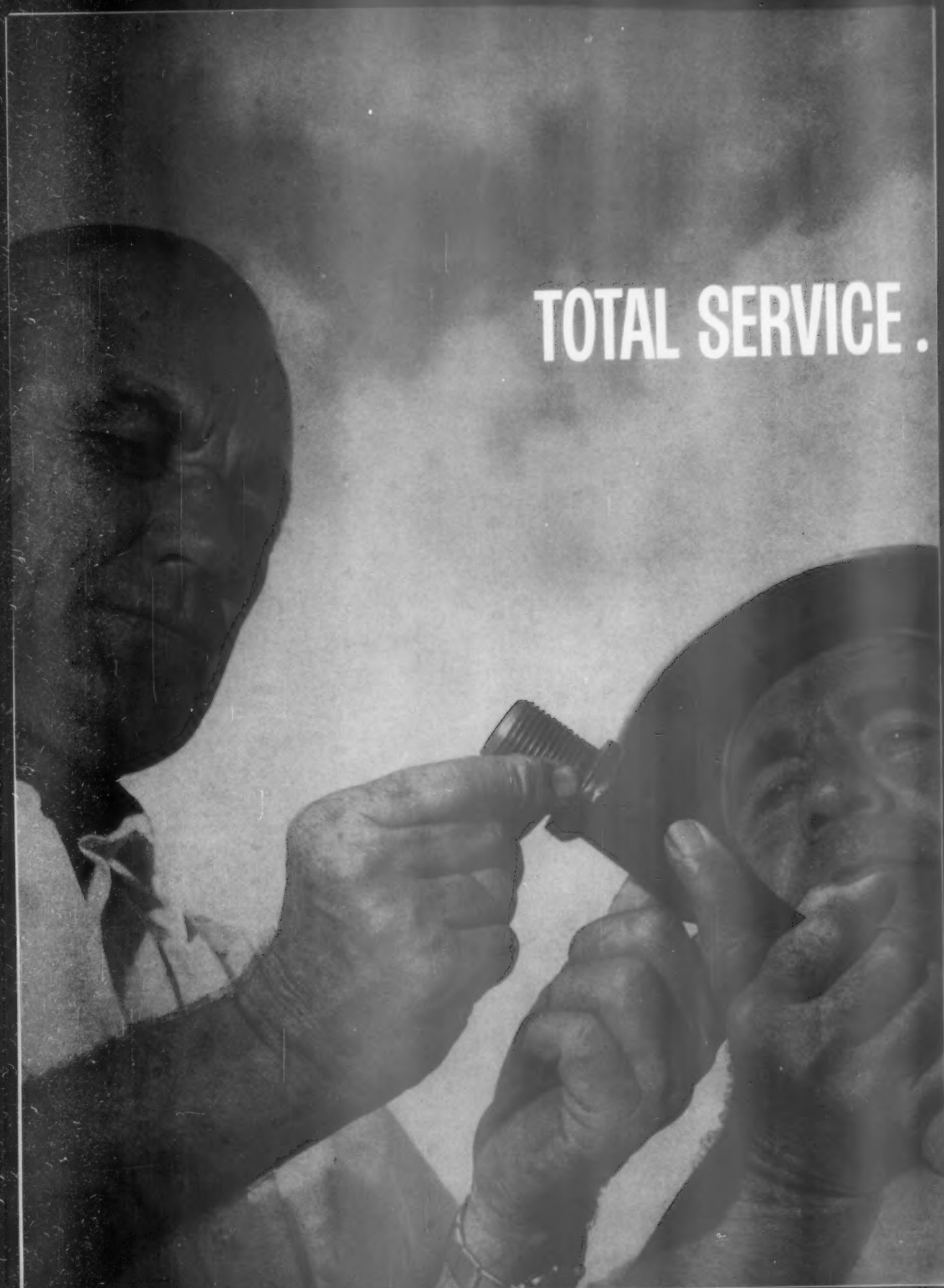
1. A valve opens to release steam from the heat exchanger.
2. A shutoff valve closes in the mud system.
3. An alarm sounds.

These features prevent overheating the mud in the heat exchanger in case of a stoppage in the line. They also prevent water in the mud from being boiled out of the line when such a stoppage occurs.

Measuring viscometry. The line leading from the high-temperature reservoir is insulated and wrapped with resistance wire for electrical heating. This particular line allows viscometric properties of the drilling fluid to be measured at high temperature. Measurement is made at various flow rates of the pressure drops over a length of the tubing with temperature held constant.

A bellows-type differential-pressure gage with taps in the tubing 8 ft. apart shows pressure drop. Two feet of "calming distance" proceeds the first pressure tap.

From the high-temperature vis-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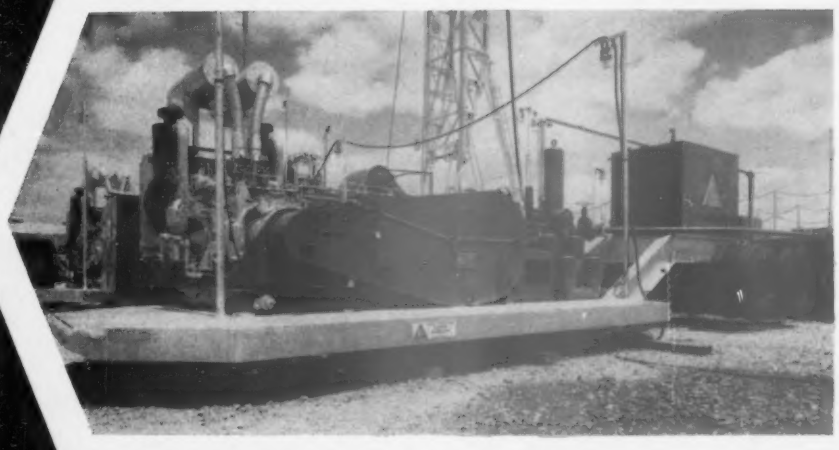

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cosity tube, mud flows into the cooler-heat exchanger. This cooler is a mild-steel cylinder 55½ in. long and 10½ in. in diameter. It contains 32 passes and otherwise is the same as the heater-heat exchanger. This portion of the system simulates annular cooling of the mud as it rises to the surface.

Temperature of mud emerging from the cooler is controlled by a bulb-type temperature-control valve. This valve adjusts flow rate of cooling water into the cooler and thus determines "flow line" temperature of the mud.

From the cooler, mud flows through another section of tubing which measures viscometric properties at flow-line temperature. Again these properties are measured by pressure drops (using a differential pressure gage) across a length of tubing. Hence, we have means to see high-temperature and low-temperature flow characteristics.

A line from the viscosity tube to the sample vessel forms the remainder of the simulated annulus. In this line are installed the following: (1) A pressure gage, (2) an automatic shutoff valve, (3) a back-pressure regulating system which can adjust pressure while mud is circulating, and (4) a flow-rate-measuring device.

The back-pressure system consists of two different-length sections of small-diameter (3/16-in.) plastic tubing in bypass around the main line. Each section is removable, in turn, from the unit while the mud is circulating. Hence, the length of the bypass tube can be changed, if necessary, to increase pressure drop and thus increase the back pressure on the system.

The flow-rate-measuring system consists of a magnetic flowmeter with an electronic recorder. It has a flow measuring range of 0 to 10,000 cc. per minute. From the flowmeter the mud returns to the sample vessel. Thus, the mud completes the circuit through the circulating unit.

Soon to be added to present equipment is a high-temperature, high-pressure filtration unit. Samples for filtration will come directly from the high-temperature flowline. After sampling, temperature of the sample will be maintained by circulating hot mud around the test cell.

Finding heat transfer. One of the problems in designing the unit was determining size of heat exchangers necessary to heat and cool the mud at the flow rates desired. Heat flow depends not only upon mud flow rate but also on mud density. Density was to vary between 8 lb. per gal. and 18 lb. per gal. Further, viscometric properties were certain to vary widely.

In design, it was necessary to get some value of the over-all heat-transfer coefficient "U" for the "steam to mud" system. We got an approximation of this value from a simplified circulating system in which mud was pumped through copper tubing. Part of this system was heated with steam and part was cooled by a water bath.

After the present circulating unit was complete, we could get more complete information on heat transfer. For this purpose, we used a 14-lb. per gal. mud having the following:

Artificial sea water	74% by volume
Drilling-mud surfactant	3.7% by volume
Clay mix*	42 lb. per bbl.
Attapulgite clay	7.5 lb. per bbl.
Barite	276 lb. per bbl.

Some runs used only this base mud; others used the base mud plus 6 lb. per gal. of low-viscosity, technical-grade, sodium carboxymethyl cellulose. Table 1 shows some of the effects of increasing temperature on stability of mud components.

Over-all heat-transfer coefficient for the mud being circulated through the heater was calculated as follows:

Q = rate of heat transfer, B.t.u.-hour

$$= 60 \rho q C (T_2 - T_1)$$

Where:

T_2 = temperature of the mud leaving the heater, °F.

T_1 = temperature of the mud entering the heater, °F.

C = approximate specific heat capacity of the mud, based upon its composition.

$C = 0.75$ B.t.u. per lb. per °F.

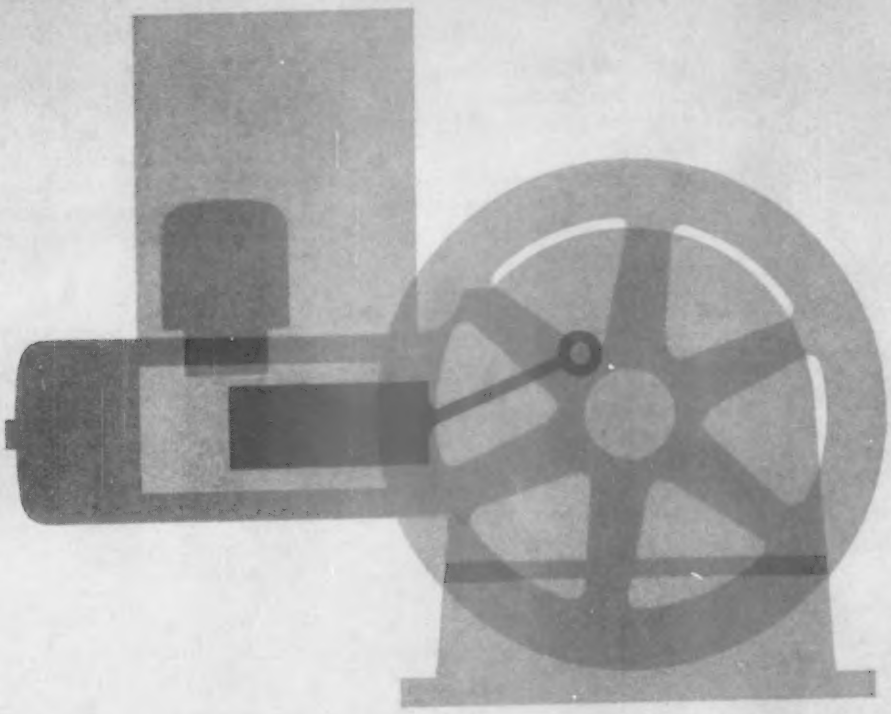
q = mud flow rate, g.p.m.

ρ = mud density, lb. per gal.

LMTD = Log mean temperature difference, °F.

$$= \frac{T_2 - T_1}{\ln [(T_s - T_1)/(T_s - T_2)]}$$

*Clay mix consists of 60 wt. % medium-grade clay, 17.3 wt. % high-grade bentonite and 22.7 wt. % low-grade mixed clays and inert minerals.



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Where:

T_s = temperature of saturated steam at pressure P (psia.) supplied to the heater, °F (this neglects the small contribution due to superheat of the steam entering the heat exchanger. Steam line pressure = 195 psia.)

U = over-all heat-transfer coefficient

$$= \frac{Q}{(LMTD)\ (A)}$$

Where:

A = external area of the tubes, ft.^{2}; = 5.93 ft.^{2}

Over the ranges we studied, over-all heat transfer was:

1. Dependent upon yield point of the mud.
2. Dependent upon initial gel strength (again indicating dependence upon true yield point).
3. Independent of plastic viscosity and temperature.
4. Independent of flow rate.

Putting to use. Since drilling fluids trap and absorb air at the surface it is important to know if this air reacts with mud additives—particularly at high temperatures—to change mud properties. For instance, filtration-control additives might degrade under these conditions and no longer function effectively. Further, if oxidative degradation is important and if present materials are to be used, methods are needed to combat the degradation. Antioxidants might be found to be economically sound. There might be a practical value of pH at which oxidative degradation would be slowed. The problem might be eased at the rig by such means as submerged guns to minimize contact of the mud with air during stirring.

Obviously, the problem could be eliminated by materials not subject to oxidative degradation. In any event, it becomes necessary to study the reactions of the mud additives in a system that can be continuously watched and treated.

Besides the degradation by oxidation, there is the problem of degradation as a result of high temperature. Most additives for controlling filtration are thermally unstable at the temperatures now being reached in drilling. Big quantities of the materials are continually added in drilling deep wells. Unfortunately, the bomb method of study doesn't allow us to simulate these continual treatments.

Our new circulation unit makes it easier to study both the oxidative and thermal degradation of filtration-control materials. Studies from this unit show the temperature at which both modes of degradation become important and rates at which they occur. Furthermore, we have used atmospheres of both nitrogen and air with different muds to see if the rate of degradation can be changed.

In one case, we discovered that rate of degradation by oxidation at 300° F. is equal to that of thermal degradation at 350°. In this test of thermal degradation, we used a nitrogen atmosphere to eliminate contact with oxygen from the air.

Another use of the circulating unit has been study of corrosion by drilling fluids. For this purpose, corrosion probes are inserted in both high-temperature and low-temperature zones of the circulating system. By this means, we could study the effects of various additives on the drilling fluid and the corrosion rates of these fluids.

Of particular interest in the study of drilling-fluid additives are the functions and stabilities of thinners at high temperatures. This study sheds light on proper use of these materials and gives indications of their limitations. Some materials which are thinners under flow-line conditions actually cause viscosity increase when the mud is circulated under downhole conditions.

In other cases the mud is much more viscous on the surface than downhole. In such a case it would be possible to use a system which under surface conditions would appear to be too thick but which under downhole flow conditions would be entirely satisfactory.

There is still another important aspect which has been noticed with one of the thinners. During the first 100° of temperature rise above room temperature, the thinner produces almost the limit of its viscosity reduction. Further temperature increase produces no significant reduction in viscosity.

Acknowledgment

The authors thank Dewitt Coffey, Jr., for his assistance in taking data for heat-transfer determinations.

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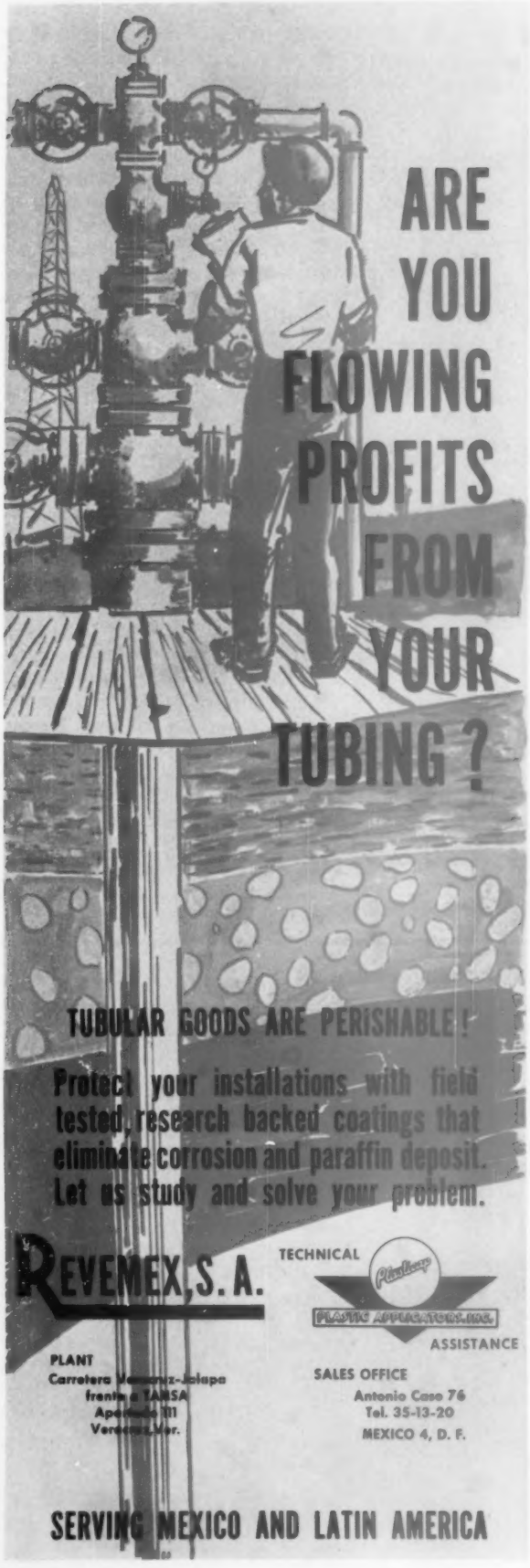

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Operating costs—Methyl ethyl ketone dewaxing

BY W. L. NELSON
Technical editor and petroleum consultant

THE MEK process of dewaxing is by far the most popular of the modern solvent-dewaxing processes. Although MEK dewaxing is not cheaper than propane dewaxing (combined with other propane processes) its popularity apparently is caused by the quality of the MEK waxes and the dependability of the operation. Elements of operating costs are shown in Table 1, so that refiners can supply their own unit costs and build up operating costs that apply to their own specific operations. Deoiling of wax is usually conducted in the same plant and equipment, but the cost of deoiling is not included in Table 1—rather it will be discussed in Process Costimating No. 111 along with other deoiling processes.

Little specific information appears in the literature regarding operating costs but direct costs (48 to 89 cents per barrel based on 1956) check reasonably well with the costs of Table 1.

COST INDEXES

	Nelson Refinery Construction*	Nelson Process Unit Operation*	MEK Solvent†
1926	72.0	46.4	....
1934	62.7	32.2	....
1936	67.3	33.2	....
1938	76.8	36.0	....
1940	77.6	37.2	....
1942	83.7	43.2	....
1944	88.1	52.8	....
1946 basis	100.0	62.9	....
1947	117.0	76.5	....
1948	132.5	76.8	77.8
1949	139.7	71.3	85.2
1950	146.2	75.1	80.0
1951	157.2	80.5	102.2
1952	163.6	82.2	94.5
1953	173.5	87.3	94.5
1954	179.8	88.4	94.5
1955	184.2	91.5	94.5
1956 basis	195.3	100.0	100.0
1957	205.9	107.7	105.2
1958	213.9	105.8	106.9
1959	222.1	106.0	103.3
1960	228.2	107.2	103.3
1961 est.	232.0	107.5	103.3

*Appears in the first issue each month in The Oil and Gas Journal.
†Published each quarter (April, July, October, and January) on the Itemized Cost Indexes page of The Oil and Gas Journal.

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Table 1—Elements of operating costs of MEK dewaxing, cents per barrel of feed (1956)

Element	Unit (somewhat standard)	1956 Unit Cost	Cents per-barrel for 1,000 BPD	4,000 BPD	10,000 BPD	Refer to Process Costimating No.
Labor—operating	3-5 men/shift*	$3.12/hour†	15.0-22.5	3.7-13.1	3.4- 5.2	26, 28, 41, 50, 57
Labor—supervision	0.4-0.8 men/shift*	$3.85/hour†	2.3- 5.5	0.7- 2.5	0.5- 1.1	
Maintenance	1.5-3.5%/yr. of replacement	$860-1,333/daily bbl.	5.5-11.0	4.2- 8.4	3.5- 8.2	29, 77
Steam	200-300 lb./bbl.	45-60 ct./1,000 lb.	9.0-18.0	9.0-18.0	9.0-18.0	17, 18
Power	2-7 kw.-hr./bbl.	0.8-1.0 ct./kw.-hr.	1.6- 7.0	1.6- 7.0	1.6- 7.0	13, 14, 21, 23
Fuel	130-300,000 B.t.u./bbl.	20-40 ct./M.M. B.t.u.	2.6-12.0	2.6-12.0	2.6-12.0	3, 4, 6, 30, 75
Cooling water	1,400-1,900 gal./bbl.	1.3-2 ct./M. gal.	1.8- 3.8	1.8- 3.8	1.8- 3.8	15, 16, 38
Solvent loss	0.04-0.08% of circulation	16 ct./lb.	2.0- 7.0	2.0- 7.0	2.0- 7.0	
TOTAL DIRECT OPERATING COST (probable extremes)			50.0-78.0	36.0-63.0	34.0-55.0	
Obsolescence, ins., taxes, etc. (10% per year of replacement)			36	28	24.5	99
Royalty, if any (estimated)			2.5- 5.0	2.5- 5.0	2.5- 5.0	7
Laboratory overhead	0.3-1.0 men/shift	$3.12/hour	2.2- 4.5	0.6- 1.9	0.3- 0.8	26, 28
Other possible charges			40.0-46.0	30.0-35.0	26.0-31.0	

*Small independent refiners use about two-thirds as many men whereas major operators use about 50% more men.
†Average U. S. wages including 27% for all burdens.

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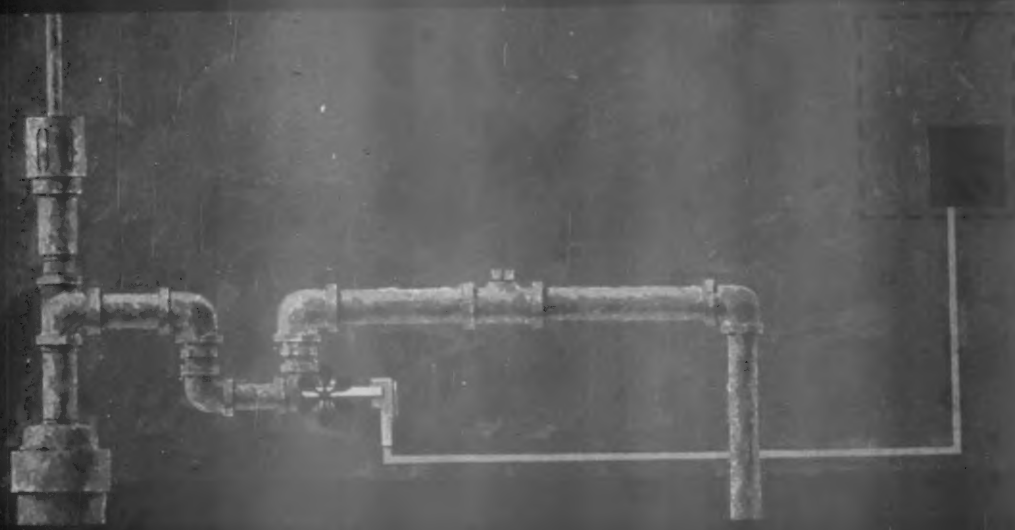

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The case for HOLDING PONDS . . . Two refineries find them highly effective

BY TROY C. DORRIS, B. J. COPELAND, AND DONALD PATTERSON

MANY REFINERIES discharge waste water into a series of holding ponds. Studies at Apco Oil Corp.'s Arkansas City, Kans., and Cyril, Okla., refineries indicate that this is an effective method of treatment.

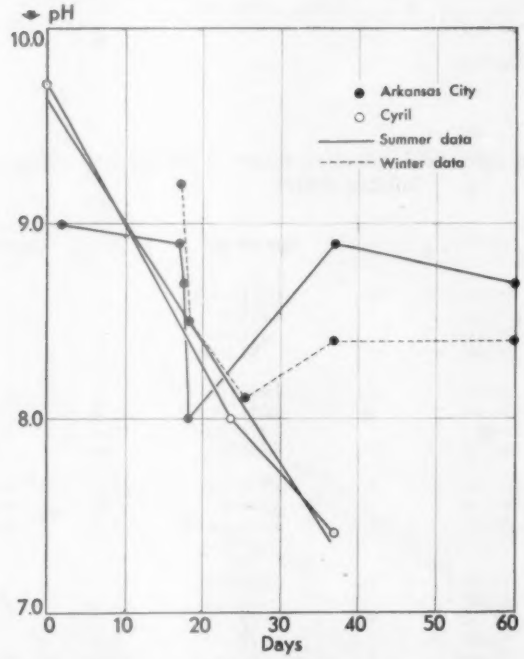
These studies showed that about 40 days' holding time would reduce nearly all components to the minimum. Many components took less than 40 days.

Here's a summary of the findings:

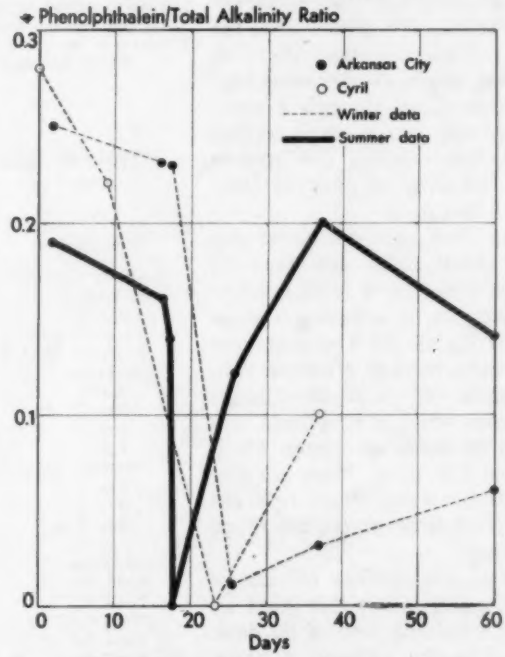
- Peak reduction in pH and alkalinity took about 25 days. From 80 to 90% of ammonia nitrogen was removed and phenol and sulfides were reduced more than 90% in about 5 weeks.
- After about 3½ weeks, effluents were not toxic to fathead minnows by the 48-hour toxicity bioassay.
- Chemical oxygen demand was reduced slightly more than 50% in about 5 weeks.
- Biochemical oxygen demand was reduced about 80% in 25 days under both summer and winter conditions.

Processing. The Arkansas City refinery processes 20,000 bbl. of

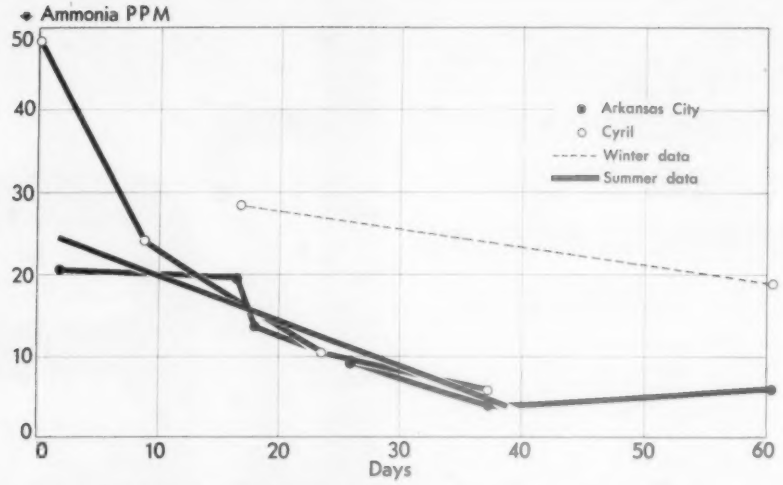
Author Dorris is an associate professor of zoology, while author Copeland is a National Defense Education Act fellow at Oklahoma State University, Stillwater, Okla. Author Patterson is chief chemist at Apco Oil Corp.'s Arkansas City, Kans., refinery.



HYDROGEN-ION CONCENTRATION changes at Arkansas City are probably characteristic of stabilization. Regression shown for Cyril is —0.06 per day. Fig. 1.



PHENOLPHTHALEIN-TOTAL alkalinity ratio declines at first, representing normal stabilization. Fig. 2.



AMMONIA-NITROGEN CONCENTRATION was reduced at a uniform rate for 37 days. Regression for combined summer data from both refineries was —0.57 per day. Fig. 3.

crude per day. Processes include atmospheric and vacuum distillation, catalytic cracking, HF alkylation, propane deasphalting, and catalytic reforming.

The Cyril refinery processes 10,000 bbl. per day. Processes include crude distillation with light-naphtha specialities, vacuum distillation, catalytic cracking, polymerization, and catalytic reforming.

Raw waste. Effluents discharged to the pond systems are raw, untreated (except for skimming), full-range refinery wastes. Chemical characteristics are shown in Table 1.

Holding ponds. At Arkansas City the effluent flows through a separator pit and over a small cooling tower before entering the holding ponds. The series of ponds is composed of two parts.

In the first part are three oil-settling ponds which are about 14 ft. deep. Water flows from pond to pond through a submerged pipe. After leaving the third oil pond, the water passes through a narrow concrete flume into a small concrete basin from which it is sprayed into a series of oxidation ponds which are about 5 ft. deep. There are four ponds in this series. Water from the fourth pond flows through a flume into a river.

With an average raw effluent of 781,000 gal. per day this pond series has a holding time of 60 days. Included in the effluent is about 288,000 gal. per day which is recycled from the outlet of the third oxidation pond to the barometric condensers. Size and holding time of each pond are shown in Table 2.

At Cyril, the effluent passes through a series of three small oil-settling ponds which have an estimated holding time of 9 days. From here, the water is pumped over a small cooling tower into a series of six oxidation ponds. Each pond in the series is separated from the other by an underwater pipe. Because the ponds are built on sloping land, the water in the last six ponds flows from pond to pond down a short flume where there is a certain amount of aeration. Water flows from this series of ponds into a river.

With an average flow of 216,000 gal. per day, this pond series has a

Table 1—Raw waste characteristics

Refinery—	Arkansas City* Average	Arkansas City* Range	Cyril Average	Cyril Range
Volume, M. gal. per day	781.0	201-532	216.0	.....
Temperature, °F.	90.0	82-98	.....	.....
pH	9.1	8.7-9.3	9.7	.....
Alkalinity P, p.p.m.	53.0	14-94	68.0	0-135
Total, p.p.m.	255.0	174-296	243.0	20-360
Ammonia nitrogen as N, p.p.m.	25.0	16.4-35.0	51.0	28-72
PO_4, p.p.m.	1.0	.....	.....	.....
Phenols, p.p.m.	2.8	0.3-12.0	12.6	4.8-22.4
Sulfides, p.p.m.	12.7	.....	8.8	1.3-16.4
Dissolved oxygen, p.p.m.	0.0	.....	0.0	.....
Immediate oxygen demand, p.p.m.	9.3	.....	.....	.....
Chemical oxygen demand, p.p.m.	284.0	135-547	426.0	155-688
Biochemical oxygen demand, p.p.m.	70.0	45-85	.....	.....
% COD of BOD	24.0	.....	.....	.....
Oil, p.p.m.	50.0	22-86	.....	.....
Total dissolved solids, p.p.m.	2,232.0	2,008-4,817	.....	.....
Toxicity, median tolerance limit (TL_m^{48})	21.0	16.5-24	10.4	3.8-18.0

*After 1.9 days' holding time.

Table 2—Size and calculated retention times of oil refinery effluent-holding ponds

Description—	Area, ft.²	Avg. depth, ft.	Volume, gal.	Days retention time— Individual	Days retention time— Cumulative
Arkansas City, Kans.:					
Oil pond 2	10,860	14	1,462,300	1.86	1.86
Bay 3	116,600	5	4,273,600	5.73	31.39
Oxidation pond 1	22,400	5	594,000	0.76	17.14
Oxidation pond 2	10,000	5	594,000	0.76	17.90
Oxidation pond 3					
Bay 1	53,800	5	1,971,900	2.53	20.43
Bay 2	110,000	5	4,031,700	5.23	25.66
Bay 3	116,000	5	4,273,600	5.73	31.39
Bay 4	116,300	5	4,262,600	5.64	37.03
Oxidation pond 4					
Bay 1	119,400	5	4,376,249	10.87	47.90
Bay 2	91,300	5	3,346,300	8.64	56.54
Bay 3	39,150	5	1,434,900	3.82	60.36
Cyril, Okla.:					
Pond 4*	77,200	5.6	2,669,700	12.35	21.35
Pond 5	16,580	6.3	454,800	2.10	23.45
Pond 6	18,760	4.7	582,700	2.70	26.15
Pond 7	33,160	4.3	915,800	4.24	30.39
Pond 8	25,240	4.3	662,000	3.06	33.45
Pond 9	29,330	4.0	746,500	3.45	36.90

*First three ponds have a total capacity of 264,000 cu. ft. or 9 days' holding time.

holding time of 37 days. Size and calculated holding time of each pond are shown in Table 2.

Chemical Changes

Changes in chemical composition of effluents as they pass through the pond series are shown in Figs. 1-8. In each figure, the points on the curves are the average of data collected at a sampling station.

Our studies showed three patterns in the change of concentration of effluent components.

At Arkansas City, the most common pattern showed that there was little change until after about 16 days' holding time. Ammonia nitrogen, pH, chemical oxygen demand (COD), phenolphthalein-total alkalinity ratio, toxicity, and oxygen production exhibited this reduction pattern.

In the Cyril ponds a second pattern was observed, in which concentrations were reduced immediately, and continued at a uniform rate to the point of maximum reduction. Toxicity, pH, and phenolphthalein-total alkalinity ratio decreased in this fashion.

There was a third pattern in COD, sulfides, and ammonia nitrogen at Cyril, in BOD, at Arkansas City, and in phenols at both refineries. There was a sharp reduction early in the series, followed by a period of reduced rate of change.

These reduction processes appear to be correlated with the absence of free oxygen dissolved in the water (anaerobic condition) in the first part of each pond series. Usually no free oxygen was present until some time after the ninth day in the ponds at Cyril, and until about 16 days in the ponds at Arkansas City. This could be caused by unstable phenolic and sulfur compounds and other substances, and by bacterial decomposition of organic compounds.

In addition, the first three ponds at Arkansas City were much deeper than the first part of the series at Cyril. Reduction was more effective in the shallow ponds since oxygen from the air could be distributed more readily.

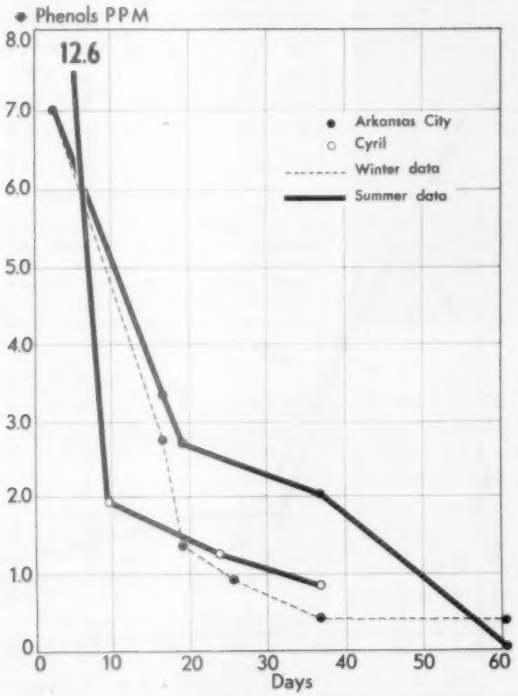
At Arkansas City, spray aeration of the effluents as they pass from the oil-settling ponds to oxidation ponds at the end of 16 days retention sharply reduced the concentration of several components.

Analysis of regression of chemical composition on days of holding time was made in each case where there was a progressive change in

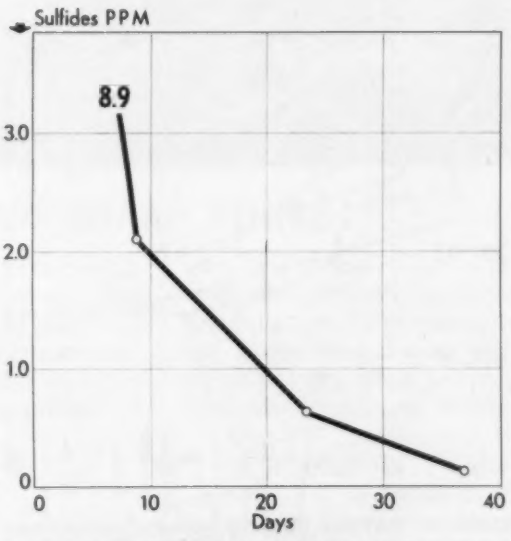
Table 3—Changes in components (regression/day) of oil-refinery effluents in holding ponds

	Arkansas City				Cyril	
	Summer		Winter		Summer	
Refinery—	Period of analysis, days	Regression	Period of analysis, days	Regression	Period of analysis, days	Regression
pH	2-18	−0.03	16.26	−0.09	0-37	−0.06
Phenolphthalein/total alkalinity ratio	2-18	−0.006	2-26	−0.0095	0-24	−0.074
Ammonia as N, p.p.m.	*2-37	−0.57	....	....	....	....
Phenols, p.p.m.	16-60	−0.058	18-60	−0.040	9-37	−0.039
Sulfides, p.p.m.	....	....	....	....	9-37	−0.070
Toxicity, median tolerance limits	2-26	+2.05	2-26	+2.87	0-37	+3.70
Chemical oxygen demand, p.p.m.	2-60	−2.12	2-26	−8.91	0-37	−5.44
Biochemical oxygen demand, p.p.m.	2-26	−1.98	2-60	−1.263	....	....
Oxygen production, lb./acre/day	16-37	−2.59	16-60	+0.46	†22-37	−1.76
					†23-37	+1.27

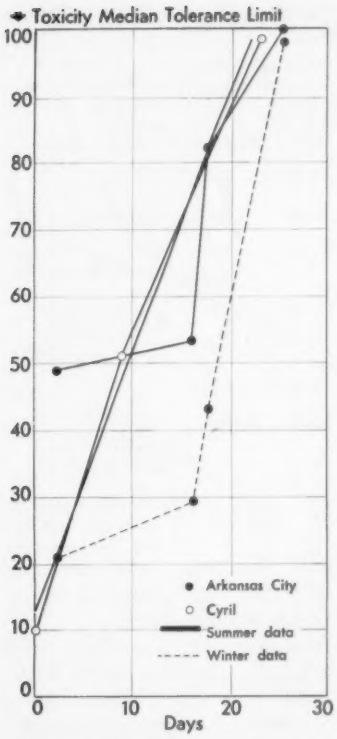
*Both refineries combined. †Winter.



PHENOL CONCENTRATION was reduced the most in the anaerobic phase in each pond series. Fig. 4.



SULFIDE CONCENTRATION at Cyril was reduced 0.07 p.p.m. per day during the aerobic phase. Fig. 5.



CHANGES IN TOXICITY show the concentration at which just half the test fish survive. Exposure period was 48 hours. Regression for Cyril series was ±3.7 per day. Fig. 6.

one direction. Regression may be interpreted as the average amount of change to be expected per day for each component. Regression of individual components is shown in Table 3.

pH. Changes in pH (Fig. 1) at Arkansas City probably represent normal stabilization. Maximum pH reduction occurred within 3 to 4 weeks, followed by a marked increase. Alkalinity relationships showed the same sequence of changes (Fig. 2). The initial decline is characteristic of stabilization processes. The later increase is probably caused by algal photosynthesis. As algae carry on photosynthesis they withdraw carbon dioxide from bicarbonates in the water. This causes a shift toward a higher pH and a higher phenolphthalein-total alkalinity ratio.

Ammonia nitrogen. Ammonia nitrogen was reduced at a uniform rate in both pond series until the thirty-seventh day under summer conditions (Fig. 3). Regression rate for both pond series combined was −0.5 to −0.6 p.p.m. per day. After 37 days, the ammonia-nitrogen concentration remained fairly constant.

Blue-green algae fix atmospheric nitrogen as ammonia.[1 2 3 4] Since this is true, it is reasonable to assume that algae maintained ammonia nitrogen concentrations at about 5 p.p.m. in these ponds. This level apparently is the minimum below which treatment by ponding cannot remove ammonia nitrogen from effluents.

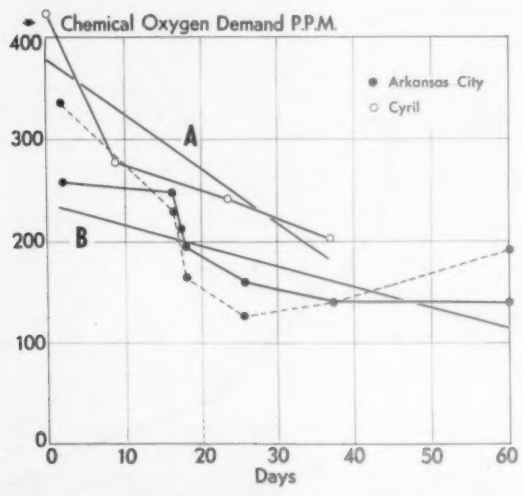
Phenols. At all seasons, phenol concentration was reduced the most in the anaerobic phase in each pond series (Fig. 4). During the summer, 85% of the phenol at Cyril, and 50% at Arkansas City had disappeared by the end of the anaerobic phase.

Under aerobic conditions, phenol was reduced at a much slower rate. It was about −0.06 p.p.m. per day at Arkansas City, and about −0.04 p.p.m. per day at Cyril under summer conditions.

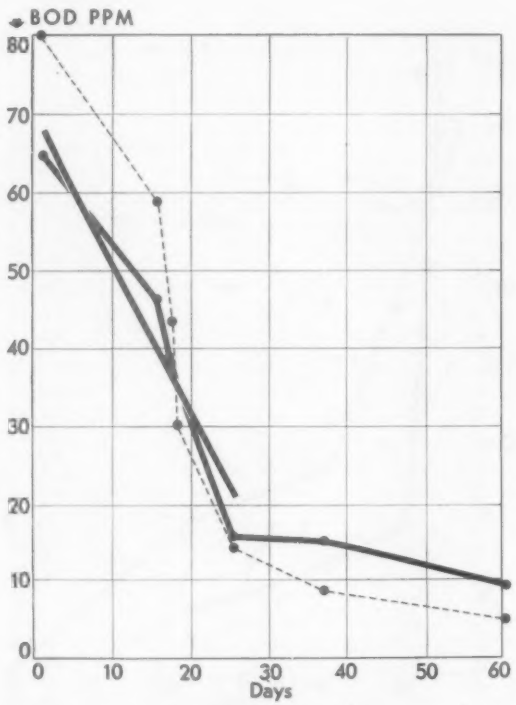
During the winter at Arkansas City, phenol was reduced more in the aerobic phase, but regression rate was only −0.04 p.p.m. per day. Phenol reduction was not complete after 37 days' holding time, but was practically complete at 60 days under summer conditions. Little or no change occurred between 37 and 60 days in the winter.

Sulfides. Sulfide concentration at Syril followed the same course as phenol, except that regression during the aerobic phase was −0.07 p.p.m. per day, or almost twice that of phenol (Fig. 5).

Toxicity. The fathead minnow was used to measure toxicity. Toxicity was expressed in terms of the



CHEMICAL OXYGEN DEMAND measure the total oxygen-consuming compounds in effluent. Regression A for Cyril is −5.44 per day. Regression B, for Arkansas City summer data, is −2.12 per day. Fig. 7.



BIOCHEMICAL OXYGEN DEMAND at Arkansas City was reduced in this manner. Regression of −1.98 per day is for summer data. Fig. 8.

median tolerance limit (TL_m), defined as the concentration at which just half the test animals survive.[5] Exposure period was 48 hours.

The fish lived through the test period in 100% concentration of effluent which had been held about 25 days (Fig. 6). Toxicity was reduced at a uniform regression rate of 3.7% per day under summer conditions at Cyril.

At Arkansas City, reduction was delayed through the anaerobic phase, resulting in regression rates of 2.05 and 2.87% per day in the summer and winter respectively.

Oxygen demand. Chemical oxygen demand (Fig. 7) was higher at Cyril than at Arkansas City and regression rate was greater. In both pond series COD had been reduced by about 50% at the end of 37 days during the summer. No further change had occurred at 60 days in the Arkansas City ponds.

The exertion of BOD as well as the chemical oxidation of unstable compounds must have caused the decrease in oxygen demand. Five-day BOD of the effluents was practically all satisfied by about 25 days in the Arkansas City ponds in both summer and winter (Fig. 8).

The 5-day BOD after 25 days' holding time may have been the result of decomposition of algae and other organisms. This explanation is strengthened by the fact that 5-day BOD after 25 days' holding time was lower in the winter when biological populations were much smaller.

Acknowledgment

Funds in support of this research were granted by the Oklahoma Oil Refiner's Waste Control Council. In addition, credit is due Richard Morris, Alec Vestal, Robert Jenkins, Richard Tubb, William Shelton, and Robert Hoffman for their assistance in making chemical analyses.

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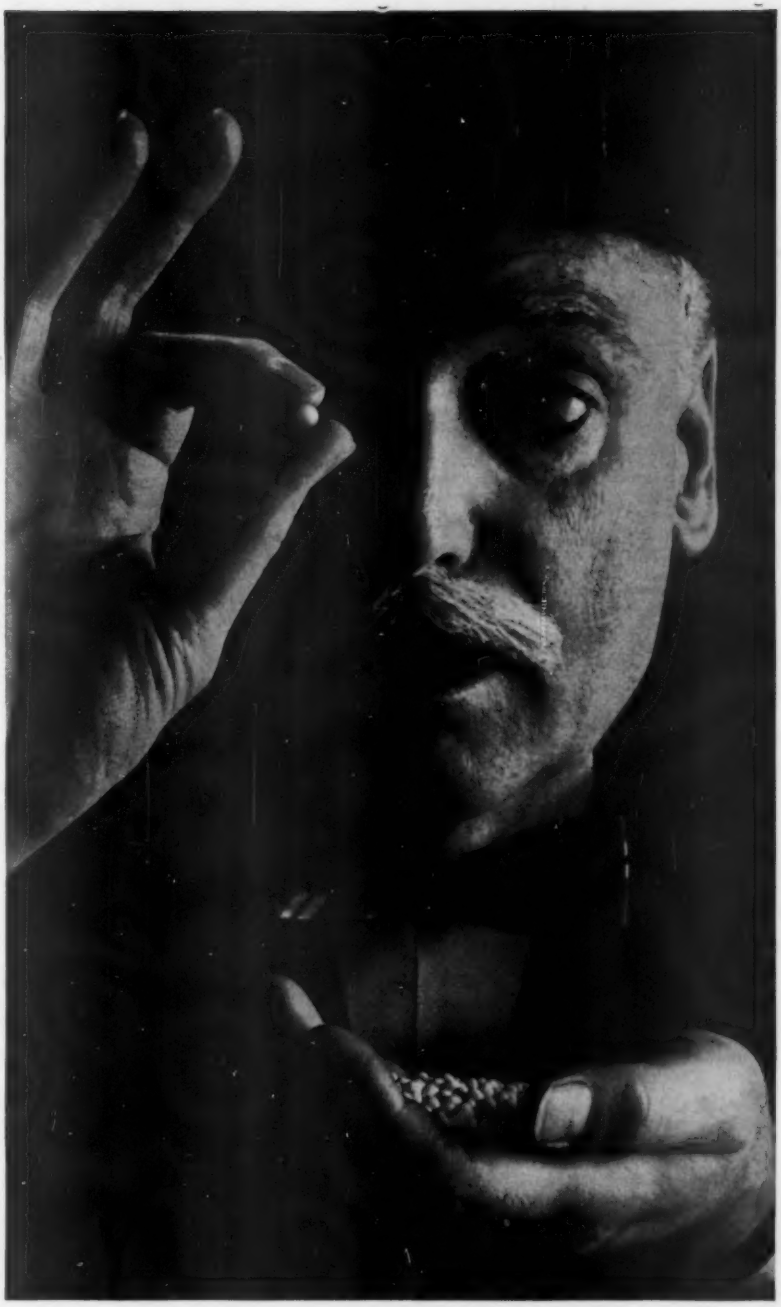

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One look at HOUDRY KAOSPHERES—Houdry Mineral Kaolin Cracking Catalyst in spherical form—shows why this advanced configuration reduces catalyst losses and minimizes erosion of equipment. There are no sharp edges to be knocked off and lost in the form of fines. And accordingly, there is far less erosive effect on processingequipment. KAOSPHERES are fully proved in commercial use, as are the full range of catalysts HOUDRY offers petroleum, petrochemical, and chemical processors. Intimate knowledge of catalysts is in every service, process and product HOUDRY offers.

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NEW-PRODUCT DEVELOPMENT VITAL TO INDUSTRY

Industrial "fairy tales" are few and far between, but here's one with more than a grain of truth. The situation, as you will recognize, has been duplicated frequently, and industry consequently suffers the waste of millions of dollars, as well as an equal amount of man hours and energy, annually — while such stories come true.

Before embarking on the short tale, however, it must be acknowledged that in today's highly accelerated economy, most companies cannot survive without new products or services for their various "publics." At this very moment, in all phases of industry, there are declining products. There are manpower and production facilities that must be utilized more profitably. *And it is to the engineers of today that industry looks for the new products and services of the future.* The road to successful new-product development, however, has many hazards, pitfalls and limitations, and insists on a realistic appraisal and appreciation of *all* the phases of development. Perhaps the following "tale" is an oversimplification, but it will serve at least to introduce the subject for closer inspection.

Once upon a time, a sharp young man named Eddie Engineer had a whopper of an idea. He thought to himself: "If I can design this Widgit, I'll bet lots of people would be glad to pay $1 for it." That very day, he went to his drafting board and started designing his Widgit. After an infinite number of calculations and endless days, he finished his design.

But, Eddie Engineer was a *thinker*, not a *maker*, so he had to find someone to manufacture the Widgit. He found the best manufacturer in his locality, a man of good reputation named Freddie Fabricator. He showed Freddie his plans and convinced him that people would easily pay $1 for a Widgit. Freddie wanted to join in the enterprise, but he had to admit, "I suppose they would pay $1 for it, but it will cost at least $2 to make one of these Widgits, even on a volume basis."

So, poor, dejected Eddie had learned an expensive lesson, because all of his time and effort had gone for naught. If his time had been dollars, he'd have been broke.

Not long after, he had another whopper of an idea, this time for a Gidgit. Before he sharpened a pencil, he went over to see Freddie. Freddie could make the Gidgit and they thought people would pay $2 for one.

FOOTNOTE: For the climax to this tale — and for its possible significance to your professional advancement, write for your complimentary copy of "New Product Development", Booklet E-11, to: Western Supply Company, Heat Exchanger Division, P. O. Box 1888, Tulsa, Okla. — where product development keeps pace with progress in the petroleum and petro-chemical industries.

REFINING BOOKS

WATER TREATMENT FOR INDUSTRIAL AND OTHER USES. Second edition. Published by Reinhold Publishing Corp., 430 Park Avenue, New York 22. 598 pp. $12.

This is the second edition of a book which has been expanded to include advancements in the art of water treatment and their applications.

The new chapters have been added—commercial and institutional water conditioning, and municipal water conditioning. The first 4 of the 19 chapters in this edition are devoted to water supplies, the various impurities which they may contain, and the characteristics of these impurities. Chapters 5, 6, and 7 cover industrial, commercial, institutional, and municipal water uses; the effects of water impurities in these uses, and briefly what processes may be used to remove objectionable impurities or reduce them to required tolerances. Chapters 8 and 9 cover boiler-feed water and cooling-water requirements.

Chapters 10 and 11 cover aeration and deaeration processes; Chapter 12 describes several types of chemical feeding equipment; Chapter 13 discusses clarification and sterilization processes; and Chapter 14 presents the various methods for removing iron and manganese. Chapters 15 and 16 cover the sodium-cation exchange (zeolite) water-softening process and the hydrogen-cation exchange water-softening and dealkalizing process.

Chapter 17 describes the various ion-exchange demineralizing and silica-removal system and distillation processes; it also briefly outlines some of the methods used for desalting sea water and brackish waters. Chapters 18 and 19 describe the cold lime-soda and hot lime-soda water softening processes and also the use of magnesia in these processes to remove silica.

There is an appendix containing definitions, equivalents, pH curves, and 43 tables of chemical factors, weights and measures, tank capacities, friction losses in pipes and fittings and other pertinent material.

MOLECULAR SIEVES. By Charles K. Hersh. Published by Reinhold Publishing Corp., 430 Park Avenue, New York 22, N. Y. 129 pp. $6.50.

This book reviews the use of natural and synthetic crystalline zeolites in separating both gaseous and liquid components by molecular-sieve action. The material presented involves only those sieves that are important in such separations.

The book also discusses the phenomenon of adsorption and explores the commercial use of synthetic zeolites. In addition, data are supplied which can help engineers design adsorption units. The information presented may also help solve specific problems concerned with dehumidification, separation, and catalytic activity.

Chapter headings include physical chemistry of adsorption, the natural zeolites, adsorption properties of natural zeolites, commercial aluminosilicates, test and design data of commercial aluminosilicates, and other uses of commercial zeolites.

RADIOISOTOPE APPLICATIONS ENGINEERING. By Jerome Kohl, Rene D. Zentner, and Herbert R. Lukens. Published by D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J. 562 pp. $16.50.

This book evolved from courses in radioisotope applications given at Tracerlab, Inc., and the University of California. It has been written for engineers, chemists, and biologists who are either considering using radioisotopes or are using them now.

The book is divided into three principal sections. The first nine chapters present basic information relating to nuclear physics, radioisotopes, shielding, legal and safety aspects of radioisotope use, calculations for a tracer experiment, and measurement and statistics of nuclear radiation. Chapters 10-16 discuss specific radioisotope applications and include many references to work carried out in the United States and abroad. Applications covered are primarily those of interest to industry, including measuring flow, leakage, and concentration; determining friction and wear; radiography, thickness, and density gaging; radiation processing; and process-engineering applications of radioisotopes. The third section of the book, an appendix, includes an up-to-date version of the General Electric chart of the nuclides, a discussion of sources of information on radioisotope applications, a complete table of neutron activation products, and a compilation of useful constants and conversion factors.

RULES AND METHODS FOR CALCULATING THE PHYSIOCHEMICAL PROPERTIES OF PARAFFINIC HYDROCARBONS. By V. M. Tatevskii, V. A. Benderskii, and S. S. Yarovi. Translated by Margaret F. Mullins. Translation edited by B. P. Mullins. Published by Permagon Press, 122 East 55th Street, New York 22, N. Y. 128 pp. $5.50.

This book presents the best methods developed during the last 10 years for calculating the physicochemical properties of alkanes and especially of the higher ones. The methods of calculation are presented in such a way that they may be used readily by the engineer or research chemist, and the designer working in the chemical or petroleum-processing industry.

All necessary data are given for the calculation of molecular volumes, densities, heats of combustion, heats of formation from elements, latent heats of vaporization, vapor pressures, boiling points, and some other properties of the higher paraffinic hydrocarbons.

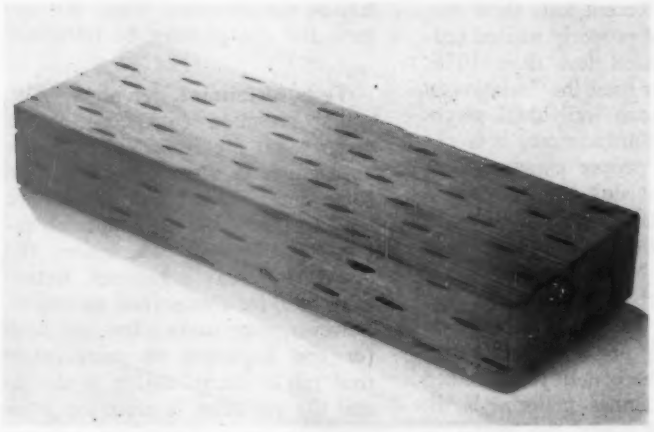
Calculations of many properties of the C_5-C_{10} alkanes and certain properties of the C_{11} alkanes have been done by the authors; the results are given in a completed form.

THE CHEM-PETRO GUIDE (Asia-Africa-Australasia). Published by Noyes Development Corp., 38 East 57th St., New York 22, N. Y. 66 pp. $12.

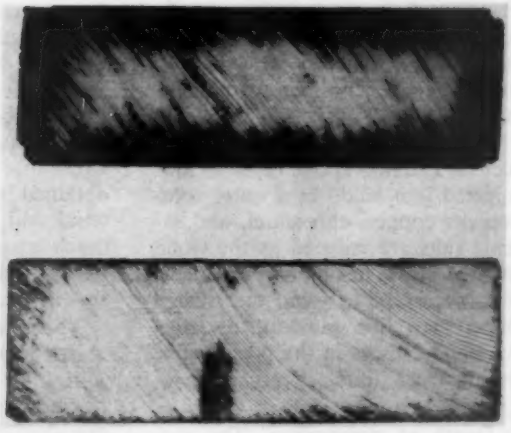
This new guide gives a complete, clear picture of chemical activities in such countries as Australia, Japan, South Africa, United Arab Republic, Morocco, New Zealand, etc. It describes the 500 leading chemical and petroleum firms in this area and lists company names, street addresses, ownership, affiliated firms, plants, and products.

QUALITY ASSESSMENT OF PETROLEUM PRODUCTS. Edited by George Sell. Published by the Institute of Petroleum, 61 New Cavendish Street, London, W. 1, 123 pp.

This book is intended to supplement the annually issued volumes of test methods of the Institute of Petroleum (IP Standards) and of the ASTM (ASTM Standards) by giving further information of the background and significance of the tests and some guidance on their use in assessing the quality and performance characteristics of the products.



INCISING PATTERN in this redwood structural member will result in uniform treatment of the wood. Fig. 1.



INCISED PIECE (top) with its thick shell of treatment is far better protected than the unincised piece (bottom). Fig. 2.

Needed:

New specs for cooling-tower lumber

Maintenance costs of cooling towers have risen considerably because of damaging wood decay. Replacement costs often run as high as 20% of the original tower cost for every 6 years of operation. It pays in the long run to adequately treat the wood.

BY W. T. HENRY
Assistant manager, technical dept.
Wood preserving div., Koppers Co., Inc.

THE wood-treating industry has gained a great deal of knowledge covering what is required to satisfactorily treat redwood cooling towers. Little progress has been made, however, in changing specifications to take advantage of this knowledge.

As with many developments, the users' benefit has often been overlooked because of small differences of opinion or because complete data to justify changes were not available. Many towers being treated today may not give as much as 15 years of maintenance-free service.

To obtain a satisfactory treatment of redwood, it is absolutely necessary to require (1) a rigid moisture-content limitation for the redwood before treatment and (2) that redwood over 1 in. in thickness be incised to a minimum depth of ⅜ in. before treatment.

Adequacy of treatment should be based not only on penetration determined from borings taken from the treated wood, but also on assay of borings to determine preservation retention.

The initial cost of adequate treatment is low compared to the repair cost for towers made from untreated lumber. Cost comparisons show that repair costs on a 6-year basis are double the amount needed to pressure treat the wood initially.

A new specification covering adequate treatment does not have to be complicated or wordy. This one would be more than adequate:

General. Material shall be pressure-treated with copper-bearing salt preservative in accordance with Standard C2-60, "Standard for the Preservative Treatment of Lumber, Timbers, Bridge Ties, and Mine Ties by Pressure Processes," of the American Wood Preservers' Association, except as modified herein.

Moisture content. The average moisture content as determined from 50 pieces selected at random from each charge to be treated, shall be 25% or less when the prongs of a resistance-type meter are inserted ¼ in. in material 1 in. net or thicker. No individual reading shall exceed 40%.

Incising. Incising is required to a depth of ⅜ in. for all material greater than 1-in. net thickness.

Penetration. Penetration is determined by boring the wide faces of 50 incised pieces at least 2 ft. from one end. As evidenced in these borings, penetration shall be at least ⅜ in. in 40 or more of the pieces and ¼ in. or more in the remainder.

Retention. Retention shall be determined by an assay of the treated wood. The outer ¼ in. of the 50 borings taken for the penetration determination shall be composited and analyzed for copper-bearing salt preservative, based on copper ion analysis, using American Wood Preservers' Association procedure A2. If the retention, as determined by this method, is 0.8 lb. per cu. ft. or more, the charge shall be acceptable.

First paragraph of this specification primarily defines the process of treatment and limits the pressure and temperature used during treatment. It also specifies the preservative to be used.

The selection of a preservative for use in the treatment of cooling-tower lumber is important. In addition to being toxic to wood-decaying organisms, it must also possess a high degree of permanence when exposed to the severe leaching conditions found in cooling towers.

Most standard water-borne pre-

servatives are toxic enough to wood-destroying organisms, but few of them are sufficiently resistant to leaching to be considered for cooling-tower use.

A copper-bearing preservative such as Erdalith is one of these few. Injected into wood in a water solution, its copper, chromium, and arsenic salts are reduced by the wood sugars to form insoluble compounds. It is necessary to grind the treated wood to a fine sawdust to detect significant losses in the preservative during leach tests.

Depth of penetration. The performance of any preservative treatment is affected by the depth to which it is injected into the wood. If the moisture content of redwood lumber at a depth of ⅜ in. from the surface is 50% ro less, based on the bone-dry weight of the wood, satisfactory penetration can be obtained.

Lumber moisture meters, however, lose their accuracy at moisture contents above 25% because the electrical resistance of the wood changes very little with increasing moisture content above this level. Therefore, it is necessary to determine the moisture content at a shallower depth and place a more severe limitation on the maximum moisture permitted. Since wood dries from the outside in, a predictable moisture gradient is set up, making it possible to measure moisture near the surface and relate it to the whole.

Even with a limit placed on moisture content of redwood before treatment, it is impossible to get satisfactory penetration of preservative in all pieces unless the material is further prepared. Preservatives penetrate redwood much deeper in a direction parallel to the grain than they do in a direction tangential or radial to the grain. This is common with all species. To take advantage of this, the wood-preserving industry has developed incisors which make small knife marks at frequent intervals in the lumber to be treated.

Incising is not new. The railroads adopted it for the treatment of all of their fir timbers and fir crossties many years ago. Acceptance of incising by the cooling-tower manufacturers has been slow because of lack of information relating the effect of incising to the strength of the material. Recent tests show that the strength of properly incised redwood is reduced less than 10%. This is far less than the variation in strength between individual pieces of redwood. Furthermore, it is obvious that if proper penetration is obtained by incising, the incised material will retain its initial strength much longer than material in which decay begins because it has only a superficial surface penetration.

Therefore, the specification requires incising on all material over 1-in. thick. The benefit to be gained by incising thinner material is diminished because the depth to which the incisions are made must be progressively more shallow. The potential value to be gained by incising thin material is not as great since it is not used for structural purposes in towers.

Adequate penetration. Penetration protects cooling-tower lumber from decay in two ways.

First, it builds a protective shell around the wood, providing a barrier through which the fungus organisms cannot pass.

Second, it reduces the rate at which preservative can be leached from the wood. It does this simply by increasing the distance through which any soluble portion of the preservative must diffuse through the wood structure.

The specification requires that penetration be determined by measuring boring samples taken from 50 pieces in each charge. This is a much larger sample than is normally required for other commodities in the wood-preserving industry. The use of such a large sample, however, reduces the possibility of accepting poorly penetrated members.

The new specification requires penetration of ⅜ in. in at least 80% of the pieces bored, which is standard in most specifications. This specification, however, differs from others in that it places a minimum penetration requirement on the rest of the pieces. This provides additional assurance that every structural member has adequate protection.

Most charges treated under this specification will be satisfactorily penetrated. Due to the extreme refractory nature of redwood, however, it is possible that an occasional charge will not comply with penetration requirements. When this occurs, the charge must be retreated.

Tests determine retention. The actual retention to specify for a given wood preservative in a given application is always subject to some question. Laboratory tests are used to determine the minimum retentions necessary to inhibit the growth of decay organisms. Retentions used for commercial treatment, however, must make allowance both for the depletion of preservative that might occur during a service and the variation in retention from piece to piece treated in a given charge.

Laboratory tests on a copper-bearing preservative conducted by the forest-products laboratory of the Department of Agriculture have shown that the minimum retention required to protect against the common wood-destroying fungi is less than 0.4 lb. per cu. ft. The specification we believe should be adopted doubles this retention level. This is a minimum retention requirement and, therefore, all charges processed in accordance with the specification will have more than this retention.

An assay to determine the amount of preservative in the treated lumber is new in specifications for treatment of cooling-tower lumber. But this is necessary to establish that the preservative is actually present in the treated barriers.

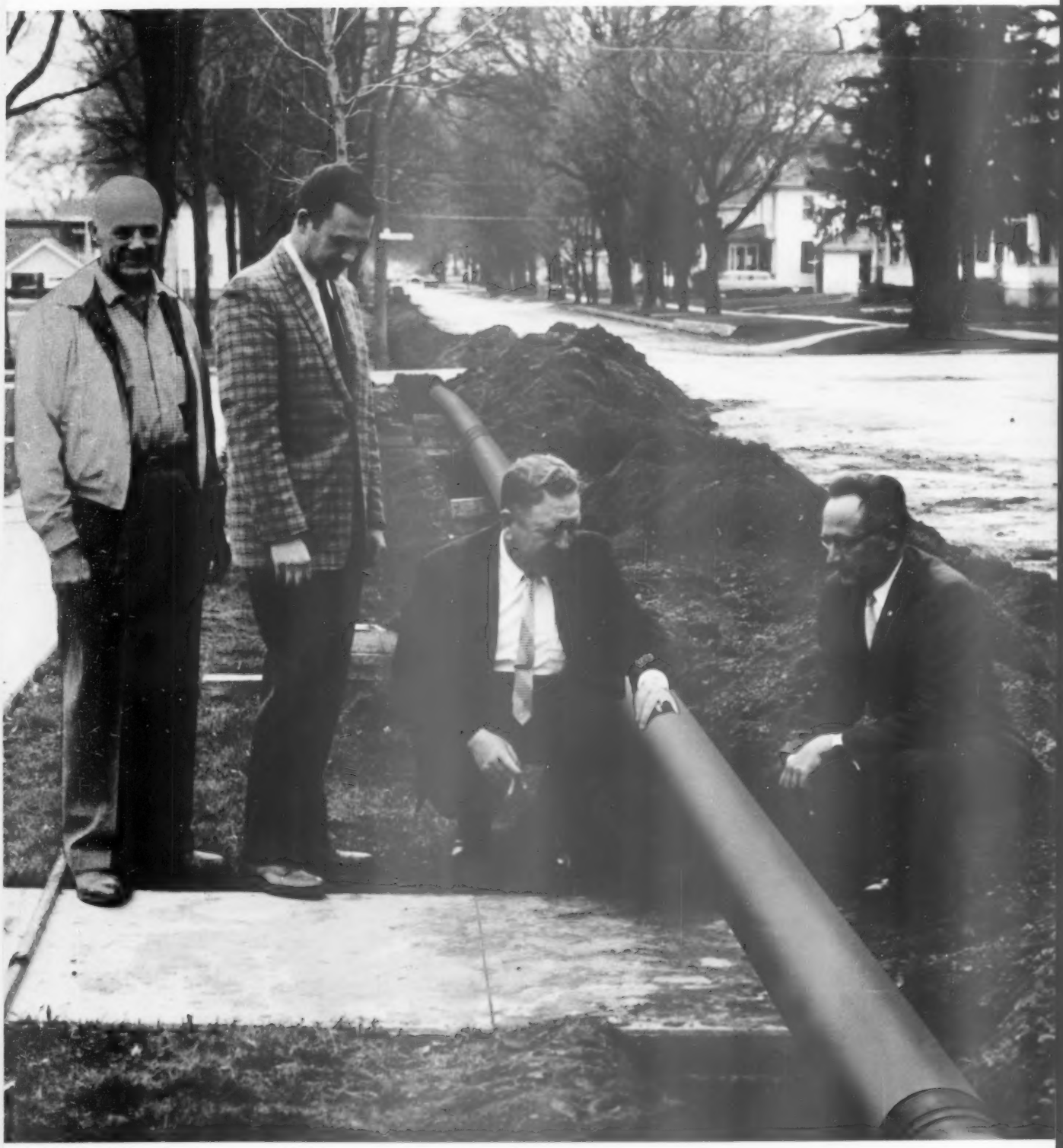
Most specifications for treatment of lumber rely on a reading of gages on a supply tank to determine retention. This method has a weakness in that it allows neither the purchaser nor the treater to double-check retention. Any preservative used out of the supply tank during the treatment is calculated as being retention. Using an analytical method to determine retention, it becomes unnecessary to specify separate retentions for different-size material in a cooling tower.

Adoption of a specification such as that discussed here will possibly increase cost. However, the total cost for seasoning, incising, treating, and preservative will still be less than 10% of the installed cost of an untreated tower. Assuming an average life of 10 years for an untreated tower, the treated tower will have paid for itself in an additional 1½ years. Thus, all service after 11½ years is free.

X-TRU-COAT BRINGS GAS TO OSAGE

...contractor says,
"Best pipe I've ever installed!"

PRINCIPALS in the Osage installation, left to right, John Mathews, Panama Williams Company, contractors; Augie Stricker, consulting engineer; Mayor Urban Marr; Donald Stuart, consulting engineer. Not shown is Joseph E. Casey, Vice President of Carlton D. Beh Company, the underwriters of the revenue bonds used to finance the Osage system. Total of X-TRU-COAT Pipe, installed in 1" to 8" diameters, is expected to reach 180,000 feet.



After welding, X-TRU-COAT Pipe joints are primed and wrapped with X-TRU-TAPE, sealing out corrosion. When welds are completed, the pipe is pulled back, lowered, and slid under drives and walks without damage.

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X-TRU-COAT BRINGS GAS TO OSAGE

Citizens of Osage, Iowa, who until this year did not have the advantages of natural gas for cooking and heating, have good reason to be elated. Natural gas is coming to Osage! Carried to homes and industry via more than 34 miles of X-TRU-COAT Pipe, the natural fuel is expected to reduce heating costs at least 25%, and cooking costs by 50%. Mayor Urban Marr and his city council are elated too, at the success of their efforts to obtain this community improvement.

John Mathews, of Panama Williams Company, contractors installing the gas system in Osage, is elated for another and very different reason. He has this to say: "I've used X-TRU-COAT on many jobs and without a doubt it is the best pipe I've ever installed. It's very easy to handle and store, and you don't have to worry about heat or cold, coating breaks, or holidays."

Mr. Mathews says further that the Osage installation is typical of many installations, in that pipe must be slid through tunnels dug beneath driveways and sidewalks—and that he has found that X-TRU-COAT will not check, scratch, or tear, even in rocky soil. X-TRU-COAT's polyethylene plastic coating, in Mr. Mathews' words, "is there to stay." Even abuse in stringing or backfilling won't damage it.

All of which means that X-TRU-COAT will fully support Osage's efforts, and the efforts of any community, with savings in original installation and dependability in service—every foot usable when received—every foot easy to install, perfectly—every foot permanently sealed against corrosion and electrolytic action, for long, long service.

Republic is proud to have shared in bringing gas to Osage. If *you* are interested in a similar project, or if you are considering an industrial use of pressure carrying line pipe, call your Republic distributor. He can cite many case histories illustrating the remarkable durability and economy of X-TRU-COAT.

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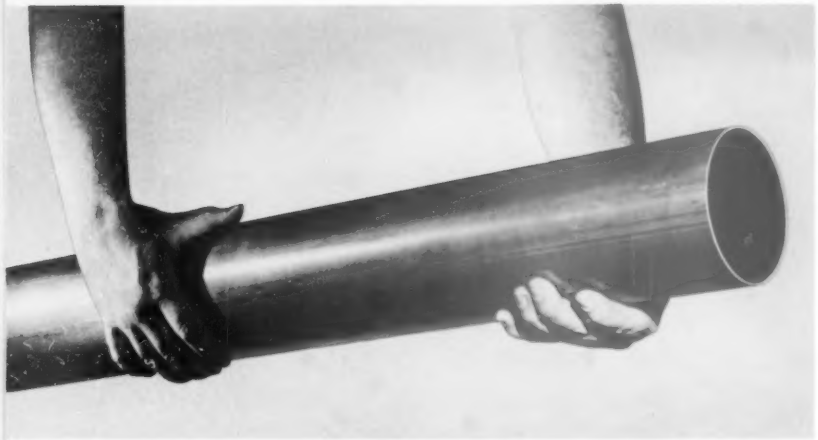

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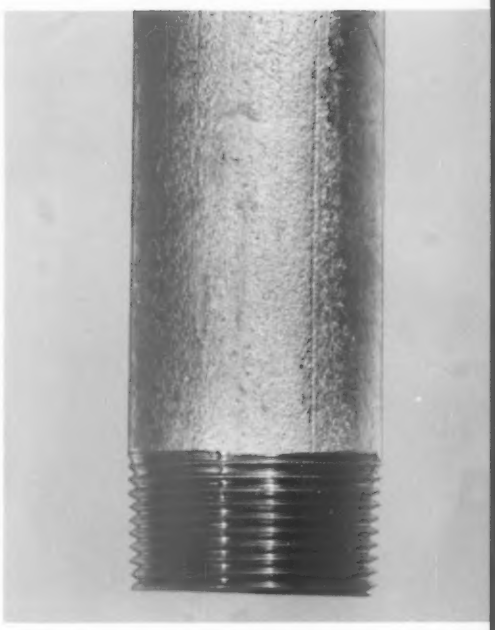

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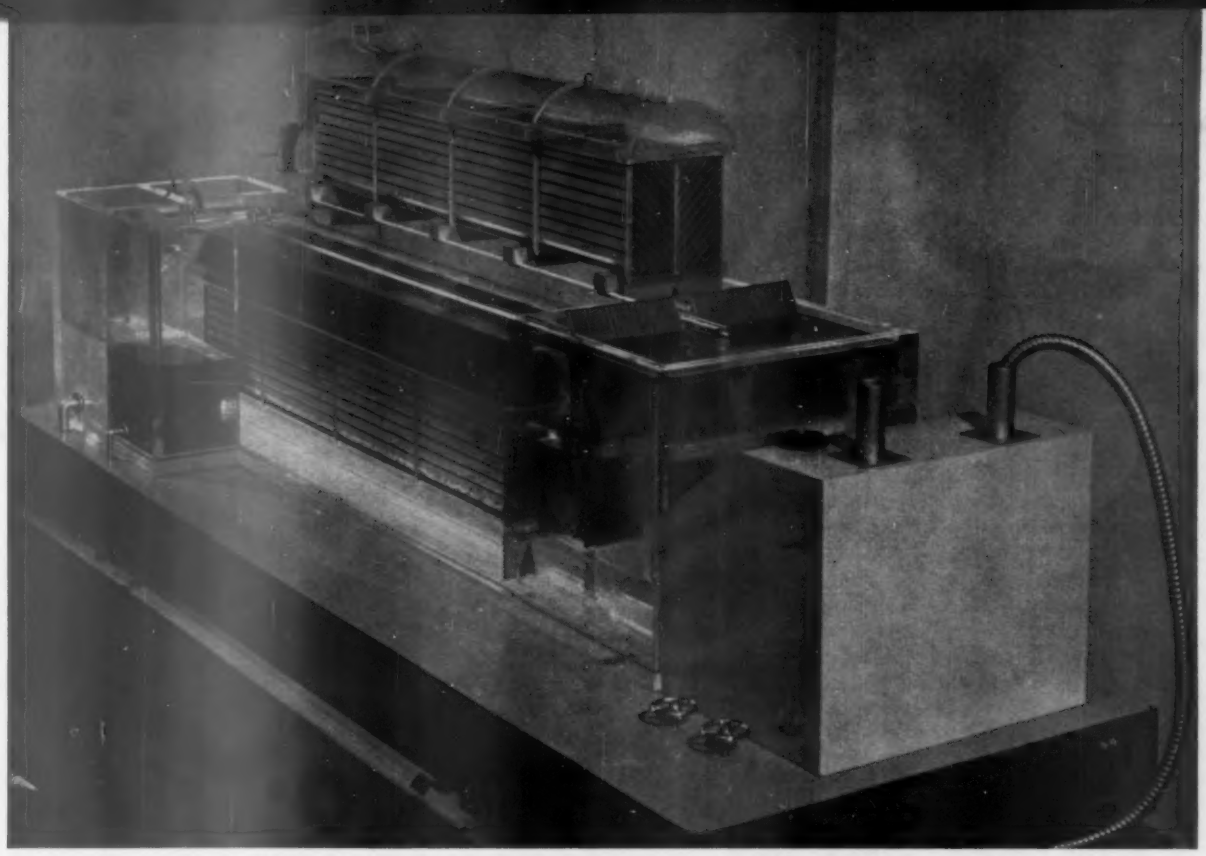


MODEL OF THE SHELL INTERCEPTOR. Scale is 1:10. One plate system with hood has been placed atop the interceptor. Fig. 1.

Parallel plates boost efficiency in gravity oil separation

BY J. CORNELISSEN
Bataafse Internationale Petroleum Maatschappij NV
The Hague

TO COMPLY with exacting demands on the purity of refining effluents the Royal Dutch/Shell Group has studied the performance and cost of gravity oil separation.

Commercial experience has led to these conclusions:

1. The performance of conventional gravity-type interceptors can be greatly improved by installing inclined parallel plates in the bays of such interceptors.

2. Where new interceptors are to be constructed, the Shell-designed parallel plate interceptor will offer, at lower investment, many technical advantages over conventional interceptors.

Improving existing units. In a conventional gravity-type oil interceptor oil globules rise to the surface of the water, where they coalesce into a layer of floating oil. General theory and design of these interceptors are included in the sixth edition of the API Manual on Disposal of Refinery Wastes[1]. It has been found that these oil globules will also coalesce when they reach the undersurface of a horizontal or inclined plate submerged in the bay of an interceptor.

By subdividing an interceptor basin into longitudinal channels with parallel plates, its separating capacity can be increased. If, for instance, the basin is subdivided into 10 layers, the maximum path (rising height) which an oil globule has to travel before reaching a coalescing surface is reduced to one tenth of the depth of water in the basin. Thus for a given performance the length of the basin can be reduced correspondingly.

The less turbulent flow between the plates and the more uniform flow distribution over the whole cross-section will also promote separation.

The plates slant from top to bottom at an angle of about 45°. This allows the collected oil to rise along the plates to the surface of the water. Sludge slides down to the bottom of the basin.

When plates are installed in an interceptor, the reduction of oil content of the effluent will depend on: (1) ratio of plate spacing to water depth; (2) length of the plate assembly; (3) composition of the influent; and (4) flow velocity through the interceptor.

Composition of the influent is important. Usually oil globules with a range of rising velocities are present, and below a certain rising velocity oil droplets will not be intercepted. Reduction of the oil content of the effluent compared with that of a conventional interceptor

will therefore depend on the rising-velocity distribution.

At the flow velocities for interceptors recommended by the API, flow between plates will be considerably less turbulent than in a bay without plates, as shown by comparison of the Reynolds numbers. At high velocities, however, the flow between the plates may become less suitable for separation. In this case, the turbulence begun at the plate surface may hinder the rise of the oil globules.

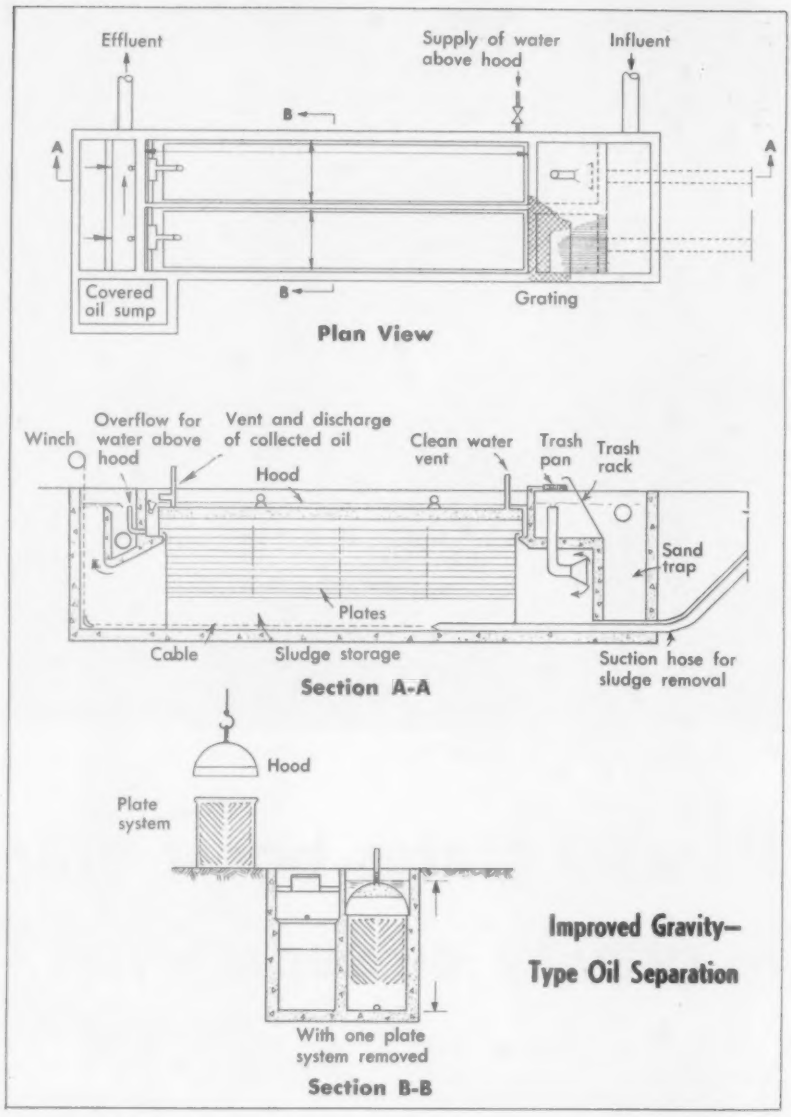
Plates reducing the rising height to about one tenth have been installed in existing interceptors at two Shell refineries.

A comparison was made in one refinery between the effluents of a bay fitted with plates over half the length and of a bay without plates. The comparison showed 40-50% less oil in the effluent from the bay with plates.

The same comparison made in the other refinery indicated 75% less oil in the effluent from the plate interceptor.

Some plate assemblies have been in use since 1956. Although only 1-mm. cold-rolled steel plate without protective coating was used, no serious corrosion has been observed. No clogging has been experienced with plate intervals of 4 in.

The plate assembly can be lifted above the interceptor for cleaning or repair. Sand should be removed from the waste water before it enters the plate assembly. The sand tends to pile up at the entrance and prevents a uniform flow distribution over the whole cross-section.



A COMPARISON in one refinery showed that there was 40 to 50% less oil in the effluent from a bay with plates than a bay without plates. The device is standard equipment in all Royal Dutch/Shell refineries.

Parallel-plate interceptor. The good results obtained with parallel plates in existing oil interceptors have led to the design of a new type of oil interceptor which is characterized by a compact, enclosed construction.

The more efficient use of interceptor volume by inserting plates reduces the size. Depending on soil conditions, construction costs are 30-50% lower than for a conventional interceptor of comparable performance.

The installation of a hood eliminates evaporation of oil collecting at the surface of the water and so prevents air polution. The space under the hood is kept full of liquid by hydrostatic pressure, since the level at the weir of the interceptor is higher than the top of the hood. The hood is covered by a clean water seal.

Because of the reduced fire hazard, this interceptor can be located closer to the processing units. Its oil-free water surface fits in with the clean appearance of modern units.

Oil collected under the hood is waterfree and is discharged automatically by hydrostatic pressure into the oil sump through an overflow pipe connected to the top of the hood.

Sludge sliding down from the plates can be removed while the interceptor is in operation by a flexible suction hose. The hose can be moved along the bottom of the interceptor by a chain and winch.

The hood can be lifted clear of the basin together with the plate assembly, from which it can be disconnected for cleaning.

After the successful commercial operation of three interceptors in two refineries for more than a year it was decided that all new refineries of the Royal Dutch/Shell Group now under construction would be provided with this patented device as standard equipment.

References

1. American Petroleum Institute, 50 West Fiftieth Street, New York 20.

This Bethlehem Rotary Drilling Line is on its seventh well —

and is still in good shape!

Natural Gas Drilling Co., Inc., is a well-organized outfit whose operations involve a lot of moving about. For example, this rig drills an average of 3,000 to 4,000 feet per well. And drilling time at each location is from 7 to 10 days—including rig-up and rig-down time.

That's why a sturdy, long-lasting rotary line is so important. It must be able to survive the rigors of moving, yet be able to go right to work on arrival. The 1-in. Bethlehem Purple Strand wire rope on this unit has already drilled six wells and is still in excellent condition. It is expected to log a lot more ton-miles.

By using long lengths of rotary drilling line and a controlled cut-off program recommended by Bethlehem, Natural Gas Drilling Co., Inc., finds they now drill more wells at a lower cost per ton-mile.

Why not phone your nearest Bethlehem Sales office for the advice of a wire rope expert? Find out how a planned cut-off program can save money for you.

Steel *for Strength ... Economy ... Versatility*

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Who's building pipelines—and where

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and contractors.

This summary appears in the last issue each month. New projects are reported weekly under Pipeline Briefs.

Projects are listed in three groups—U. S., Canadian, and Foreign—and according to type of line—crude, products, natural gas, or miscellaneous.

★ The star symbol indicates the first appearance of the project in the Journal's survey.

U. S. Crude Oil Pipelines

BELLE FOURCHE PIPE LINE CO., Box 1612, Casper, Wyo.
★ Project: 13 miles, 8⅝-in. and 5 miles, 4½-in. crude line from Miller Creek to Prairie Creek.
Completion: Nov. 1, 1961.
Contractor: Pioneer Construction.

CONTINENTAL PIPE LINE CO., Drawer 1267, Ponca City, Okla.
Project: 4-mile, 3-in., 18, 4-in., 68, 6-in., 323, 8-in., and 53, 10-in., Glacier System from Cutbank, Mont., to Byron, Wyo.
Status: Under way.
Contractor: R. H. Fulton & Co., Lubbock, Tex.
Completion: Feb. 1962.
Project: 20.7-mile, 8-in. crude line from Grand Isle to Golden Meadow, La.
Completion: December 31, 1961.
Contractor: Glaser Construction Co.

GILLETTE PIPELINE, INC., and A. W. HARTWIG, INC., Billings, Mont.
Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Pending Wyoming Public Service Commission approval.

GREAT NORTHERN PIPE LINE CO., 175 East 4th St., St. Paul 1, Minn.
Project: 64-mile extension to the Lignite field, Burke County, North Dakota.
Status: Planned.

HUNT OIL CO., Dallas, Tex.
Project: 36-mile, 3-18-in. gathering system, North Tioga area, North Dakota.
Status: Under way.
Contractor: Curran & Co.
Completion: Nov. 30, 1961.

KERR-McGEE OIL INDUSTRIES, INC., Oklahoma City, Okla.
Project: 10 miles, 2, 6 and 8-in. gathering lines, Pinta Dome field, Arizona.
Completion: Nov. 1, 1961.
Contractor: Northwest Construction, Inc.

MATADOR PIPE LINE CORP., Denver, Colo.
Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Approved by CNEB.
Completion: Dec. 31, 1961.

SHELL PIPE LINE CORP., Box 2648, Houston 1, Tex.
★ Project: 34-mile, 8-in. condensate line from Bryans Mill to Humble Pittsburgh station.
Status: Planned.
Completion: Dec. 1961.
★ Project: 12-mile, 12-in. line from Pelican Island to Nairn Junction.
Status: Planned.
Completion: Jan. 1962.

U. S. Products Pipelines

AMERICAN PETROFINA CO., Rockefeller Center, New York, N. Y.
Project: 133-mile, 6-in. line from Mt. Pleasant to Dallas-Ft. Worth area.
Status: Planned.

CARL M. LOEB, RHOADES & CO., 42 Wall St., New York 5.
Project: 75-mile, 20-in. from New Jersey refineries to Long Island airports, Idlewild and La Guardia.
Status: Proposed.

CHEROKEE PIPE LINE CO., Bartlesville, Okla.
Project: 12-mile 3-in. line from main line at St. Charles, Mo., to Lambert airport, St. Louis.
Status: Planned.
Completion: Dec. 15, 1961.

CONTINENTAL PIPE LINE CO., Bartlesville, Okla.
Project: 225-mile products line, Ponca City, Okla., to Wichita Falls, Tex.
Status: Planned.

DIXIE PIPE LINE CO., 800 Enterprise Building, Tulsa.
Project: 1,077-mile, 12, 10, 8 and 6-in. LPG line from Mont Belvieu, Tex., to Cary, N. C.
Status: Under way.
Completion: Fall, 1961.
Contractors: Section 1, Houston Contracting Co.; Section 2, Sharman, Allen, Gay & Taylor; Section 3, H. B. Zachry Co.; Section 4, O. R. Burden Construction Co.; Section 5, Stanley-Bledsoe Corp.

EL PASO NATURAL GAS CO., El Paso, Tex.
Project: 58-mile, 6 in. LPG line Jal, N. M., plant to El Paso Natural Gas Products Co. refinery, Odessa, Tex.
Status: Planned.

GREAT LAKES PIPE LINE CO., Kansas City, Mo.
Project: Conversion of 6-in. products lines from Des Moines, Iowa, to Minneapolis and to Chicago area to tie-in with Northern Gas Products LPG line from Bushton, Kans.
Status: Planned.

HUMBLE PIPE LINE CO., Box 2220, Houston, Tex.
Project: 270-mile line west from Baytown, 177 miles 8 and 10-in. with 6-in. branches 43 miles to Austin and 50 miles to San Antonio.
Status: Under way.
Completion: Early 1962.
Project: 11-mile, 6-in., Baton Rouge, La., to Dixie Pipe Line near Baker, La.
Status: Under way.
Completion: Nov. 30, 1961.

MID-AMERICA PIPELINE CO., 1437 S. Boulder, Tulsa.
Status: Planned.
Construction: 1962.
Project: 100-mile extension from Ogden to Charles City, Iowa.,

NORTHERN GAS PRODUCTS CO., Omaha, Neb.
Project: 350-mile, 8-in. LPG line from Bushton, Kans., plant to Des Moines, Iowa, connecting with Great Lakes 6-in. lines to Twin Cities and to Chicago area.
Status: Planned.

OLYMPIC PIPELINE CO. (proposed)
Project: 94 miles, 16-in.; 162 miles, 11-in., 45 miles, 8-in. and 23 miles, 6-in. from Ferndale and Anacortes, Wash., refineries to Seattle and Portland.
Status: Planned.

PASOTEX PIPE LINE CO., Box 1022, El Paso, Tex.
★ Project: 255-mile, 8-in. products line from El Paso to Warfield terminal at Midland-Odessa. Conversion and construction.
Status: Under way.
Completion: Nov. 15, 1961.
Contractor: McVean & Barlow.

POTOMAC PUBLIC SERVICE CO., Arlington. Va.
Project: 80-mile, Baltimore to Washington airports.
Status: Planned.

SERVICE PIPE LINE CO., Box 1979, Tulsa, Okla.
★ Project: 21-mile, 4-in. LPG line from Port Acres to Beaumont Junction, Tex.
Status: Planned.

TEXAS EASTMAN CO., Longview, Texas.
Project: 275 miles, 6-in. LPG line from Sweeney to Longview, Tex.
Status: Under way.
Completion: December, 1961.
Contractor: O. R. Burden Construction Co.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1, Tex.
Project: 6-mile, 8-in., Deer Park to Pasadena, Tex.
Status: Planned.

U. S. Natural Gas Pipelines

ALAMO GAS SUPPLY CO., Alamo National Building, San Antonio, Tex.
Project: 166 miles of 20, 22, and 24-in. line and 101 miles of 12, 16, and 24-in. line from Texas Gulf Coast to San Antonio.

AMERICAN LOUISIANA PIPE LINE CO., Detroit, Mich.
Project: 25-mile, 8-in. to connect Holly Ridge field, Tensas Parish, Louisiana, to main line.
Status: Pending FPC approval.

BI-STONE FUEL CO., Corsicana, Tex.
Project: 100-mile, 16-in. main line from Bethel field, Anderson County, to Merit, Hunt County, North Texas, with 75 miles, 10, 8 and 6-in. laterals.
Status: Planned.

BORDER GAS TRANSMISSION CORP. (Lehman Brothers, New York, and Rio Gas Gathering Co., 615 National Bank of Commerce Building, San Antonio 5, Tex.).

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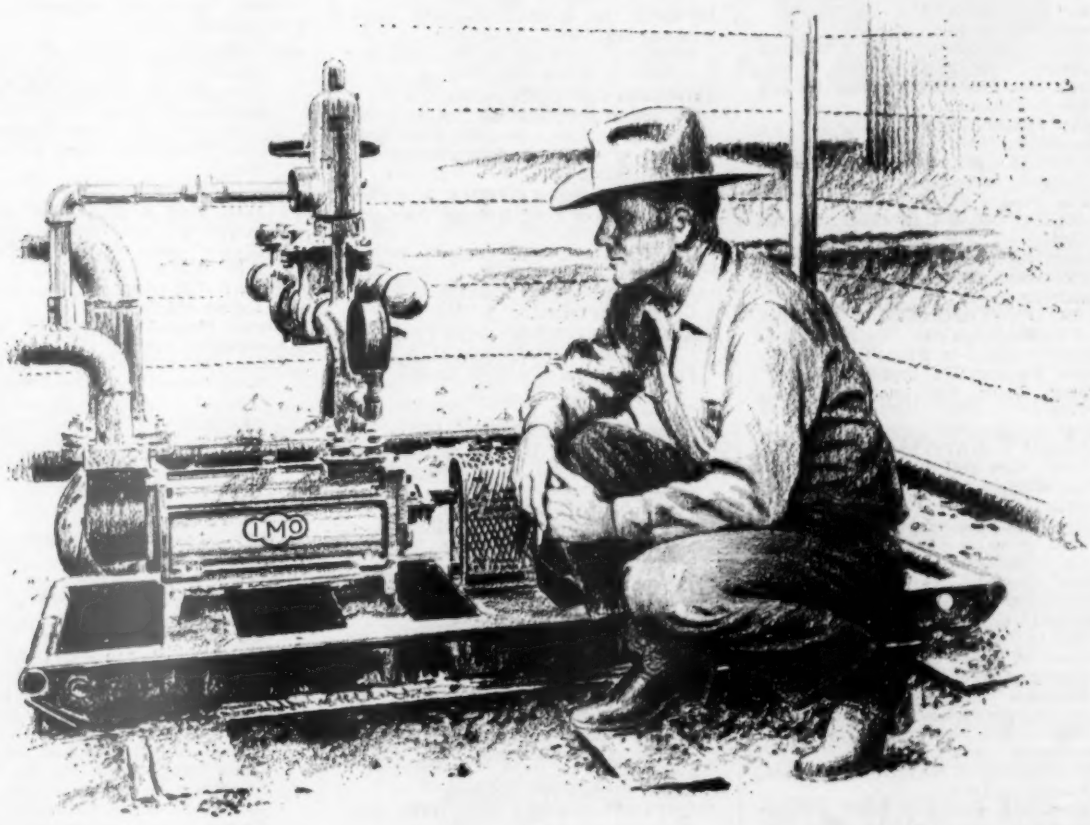
De Laval Steam Turbine Company, Trenton 2, N. J.



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PIPELINE CONSTRUCTION

Project: Gathering lines in Starr, Zapata, Jim Hogg, Brooks, and Webb counties, Texas.
Status: Proposed.
Project: Gathering lines in Dimmit, Zavala, and La Salle counties, Texas.
Status: Proposed.

CITIES SERVICE GAS CO., Box 1995, Oklahoma City 1, Okla.
Project: 10½ miles of 8-in. to connect Rounds and Porter plant with main line in Marion County, Kansas.
Status: Planned.
Project: Gathering lines in Sterling field, Comanche County, Oklahoma.
Status: Pending FPC approval.

COASTAL TRANSMISSION CO., Houston, Tex.
Project: 71 miles laterals in Florida.
Status: Approved by FPC examiner.

COLORADO GAS TRANSMISSION CO., Colorado Springs, Colo.
Project: 250-mile, 20-in. line, from Ignacio-Blanco area, Southwest Colorado, to Walsenburg, Pueblo and Colorado Springs, Colo.
Status: Application before Colorado PUC.

COLORADO INTERSTATE GAS CO., Box 1087, Colorado Springs, Colo.
Project: 7 miles of 20-in. in Texas Panhandle.
Status: Pending FPC approval.
Completion: 1961.
Project: 109 miles of 26-in. from Texas Panhandle to southeastern Colorado; 134 miles of 34-in. from there to Pueblo, and 107 miles of 30-in. on to Denver.
Status: Pending FPC approval.
Project: 155 miles of 34-in. from Rock Springs, Wyo., to Provo, Utah, to connect with El Paso's proposed 395-mile line to California.
Status: Approved by FPC.
Completion: 1963.
Project: 32 miles of 6-in. from Central Colorado to Trinidad.
Status: Pending FPC approval.

COLORADO OIL & GAS CORP., Denver, Colo.
Project: 402-mile line from Gubik field to Fairbanks, Alaska.
Status: Proposed.

COLORADO-WYOMING GAS CO., Box 480, Denver 1, Colo.
Project: 4-mile, 3-in. lateral to Erie, Colo.
Status: Pending FPC approval.
Project: 2-mile, 4-in. lateral to Niwot, Colo.
Status: Pending FPC approval.

COLUMBIA GAS SYSTEM, INC., 120 East 41 St., New York 17.
Projects: Eight loops totaling 96.9 miles, 30-in. in Kentucky, Tennessee, Mississippi and Louisiana, plus 29 miles of 12-in. gathering line from near Houma, La., to the Texaco Dog Lake field.
Status: Planned.
Completion: 1961.

COLUMBIA GULF TRANSMISSION CO., Box 683, Houston 1, Tex.
Project: 97 miles of main-line loop in Kentucky, Tennessee, Mississippi, and Louisiana, and 29 miles of 12-in. lateral supply lines in Louisiana.
Status: Pending FPC approval.
Completion: 1961.

EAST TENNESSEE NATURAL GAS CO., Knoxville, Tenn.
Project: 10.1 miles, 4-in. lateral to South Carthage, Tenn., and 13.4 miles, 6-in. lateral to Pleasant Hill, Tenn.
Status: Planned.

EL PASO GAS SUPPLY CO., (subsidiary of El Paso Natural Gas Co., Box 1492, El Paso).
Project: 228-mile, 30-in. line, Live Oak County to Sonora, Sutton County.
Status: Pending FPC approval.

EL PASO NATURAL GAS CO., Box 1492, El Paso, Tex.
Project: 61.3-mile, 10¾-in. lateral to Bremerton, Wash., to be extended 75 miles to Port Angeles by Natural Gas Transmission Co., El Paso subsidiary.
Status: Before FPC.
Project: 8.2-mile, 34-in. loop on Gallup discharge.
Status: Pending FPC approval.
Project: 14.2-mile, 6⅝-in., South Sawyer to Sinclair plant 29.
Status: Pending FPC approval.
Project: 17 mile, 8⅝-in. from Pacific Gas Transmission 36-in. line to Klamath Falls, Ore.
Status: Pending FPC approval.
Project: 37.4 miles, 8⅝-in., San Juan Main line to Snowflake meter station.
Status: Approved.
Completion: December 1961.

GRAND VALLEY TRANSMISSION CO., Green River, Utah.
Project: 16-mile line from Westover field, Grand County, to El Paso Natural Gas Co. main line.
Status: Approved by FPC.

HOUSTON TEXAS GAS & OIL CORP., Box 10400, St. Petersburg 33, Fla.
Project: 16.9 miles, 4½-in., mainline to Homestead, Fla.
Status: Temporarily certified.
Completion: Nov. 1, 1961.
Contractor: Constructors of Florida.
Project: 174.2 miles, 2⅜-in. to 6⅝-in. distribution lines in Florida.
Status: Pending approval.

HUMBLE OIL & REFINING CO., Houston, Tex.
Project: 13.5-mile, 26-in. line from Port Acres to Bridge City, Tex.

IROQUOIS GAS CORP., Buffalo, N. Y.
Project: 21.5 miles of line, 2 miles, 16-in.; 5.5 miles, 12-in.; 14 miles, small diameter, to serve Perrysburg storage.
Status: Before FPC.

MANUFACTURERS LIGHT & HEAT CO., Union Trust Building, Pittsburgh 19, Pa.
Project: 20-mile, 20-in., Glenville, W. Va., to New Milton District.
Status: Pending FPC approval.
Completion: December 1, 1961.

MICHIGAN WISCONSIN PIPE LINE CO., 500 Griswold St., Detroit, Mich.
Project: 64.5 miles, 4/10-in. Laverne field gathering lines.
Status: Planned.
Completion: Gradually over 1961.
Project: 97 miles, 16/20-in. gas line from Woodward, Okla., area to Greensburg, Kans., compressor station.
Status: Approved by FPC.
Project: 68 miles, 4/10-in. gathering system, Woodward, Okla., area.
Status: Approved by FPC.
Project: 26 miles, 30-in. loop in Michigan, 10 miles, 12-in. loop in Wisconsin.
Status: Pending FPC approval.
Project: 30 miles, 30-in. from Station 10 to Woolfolk station, Wisconsin.
Status: Approved by FPC.

MISSISSIPPI RIVER FUEL CORP., 407 North 8th Street, St. Louis 1, Mo.
Project: 5 miles of 16-in. and 15 miles of 12-in. from Collinsville, Ill., to St. Jacob, Ill.
Status: Pending FPC approval.

MONTANA-DAKOTA UTILITIES CO., Minneapolis, Minn.
Project: 106-mile, 12-in.; 22-mile, 3-in.; 20-mile, 2-in., Minot to Bismarck, N. D.
Status: Pending FPC approval.
Project: 12-mile, 6-in.; 17-mile, 4-in.; 2-mile, 2-in., Alexander to Watford City, N. D.
Status: Pending FPC approval.
Project: 14-mile, 8-in., McGregor to Tioga, N. D.
Status: Pending FPC approval.
Project: 3-mile, 3-in., lateral to Fryburg, N. D.
Status: Pending FPC approval.
Project: 2-mile, 4-in., lateral to Holly Sugar Corp., Hardin, Mont.
Status: Pending FPC approval.

NATURAL GAS PIPELINE CO. OF AMERICA, 122 South Michigan Avenue, Chicago.
★ Project: 258.92 miles 30-in. loop line in Victoria, Wharton, Montgomery, Liberty, Panola, Harrison counties, Texas; Clark, Grant and Lawerence counties, Arkansas, and Washington, Marion, Clinton, McLean and Livingston counties, Illinois.
Status: Under way.
Completion: Dec. 8, 1961.
Contractors: 133.78 miles, Panama-Williams Corp.; 78.02 miles, Williams Brothers Co.; 47.12 miles, R. H. Fulton & Co.
Project: Two 30-in. loops, 38 miles between Gum Spring and Nydis and 40 miles from Rowhatan to Missouri border.
Status: Under way.
Contractor: Williams Brothers Co.

NORTHERN NATURAL GAS CO., 2223 Dodge St., Omaha 1, Neb.
★ Project: 14 miles, 26-in. loop east of Waterloo, Iowa, and 365 miles 2-in. to 16-in. to serve 44 communities in Wisconsin, 17 in Minnesota, 3 in Iowa and one in Nebraska.
Status: Pending FPC approval.
Completion: 1962.

OKLAHOMA-ILLINOIS GAS PIPELINE CO., M. & M. Bldg., Houston 1, Texas. (Joint Fish Engineering Corp. and Pan American Petroleum Corp. venture.)
Project: 550-mile, large diameter line from Woodward, Okla., to St. Louis, Mo.
Status: Proposed.

PACIFIC GAS & ELECTRIC CO., 245 Market St., San Francisco, Calif.
Project: 67 miles of line from Kettleman Hills to Morro Bay, Calif.
Project: 120 miles of 34-in. looping of Topock-Milpitas main line.
Status: Planned. Pending FPC approval.
Completion: 1963.
Project: 291 miles of 36-in. from the California-Oregon border to Antioch, Calif. (Part of a 1,400-mile project to move Alberta gas to San Francisco.)
Contractor: H. C. Price Co., Bartlesville, Okla. (Bechtel Corp. San Francisco, is the engineering manager.)
Status: Under way.
Completion: Dec. 1961.

PACIFIC GAS TRANSMISSION Co., (Pacific Gas & Electric Co., San Francisco).
Project: 611 miles of 36-in. from the Canadian border at Eastport, Idaho, to the California border near Klammath Falls, Ore. (Part of a 1,400-mile project to move Alberta gas to San Francisco.)
Contractors: Western Pipe Line, Inc., Austin, Tex., and J. P. Neill & Co., Dallas, have contracts for the 465-mile southern portion. H. C. Price Co., Bartlesville, Okla., has contract for the 146-mile northern portion from Rosalia, Wash., to Eastport, Idaho. (Bechtel Corp., San Francisco, is the engineering manager.)
Status: Under way.
Completion: Dec. 1961.

PACIFIC LIGHTING GAS SUPPLY CO., 720 W. Eighth Street, Los Angeles 17, Calif.
Project: 24 miles, 16-in. Gaviota to Goleta, Calif.

PIPELINE CONSTRUCTION

Status: Pending California PUC approval.
Completion: Spring, 1962.

PANHANDLE EASTERN PIPE LINE CO., 120 Broadway, New York.
Project: 298 miles of 30-in. loops, 43 miles of 16 to 26-in. supply laterals, and 80 miles of 6 to 12-in. sales laterals.
Status: Pending FPC approval.
Project: 150 miles, 24-in., 50 miles, 22-in. from Elk City, Okla., field to main line.
Status: Approved by FPC.

PIONEER NATURAL GAS CO., Amarillo. Tex.
Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.
Status: Pending FPC approval.
Project: 12 miles of 10-in. from Muleshoe, Tex., northward.
Status: Pending FPC approval.

SOUTH GEORGIA NATURAL GAS CO., Box 791, Thomasville, Ga.
Project: 2½-mile, 3½-in. from main line to Sylvester, Ga.
Completion: November 1961.
Project: 2½-mile, 3½-in. from main line to Ocilla, Ga.
Completion: November 1961.

SOUTHERN CALIFORNIA GAS CO., and SOUTHERN COUNTIES GAS CO. OF CALIFORNIA, Los Angeles, Calif.
Project: 92.9-mile, 34-in., Ivanpah to Newberry, Calif.
Status: Approved by California PUC.
Completion: Jan. 1, 1964.

SOUTHERN NATURAL GAS CO., Birmingham, Ala.
Project: 14.4 miles, 20-in. gas line from Gwinville field to Pickens station.
Status: Pending FPC approval.
Completion: Dec. 31, 1961.

SOUTHERN UNION GAS CO., Fidelity Union Tower, Dallas 1, and **EL PASO NATURAL GAS CO.,** Box 1492, El Paso, Tex.
Project: 60-mile line from El Paso's main line near Holbrook, Ariz., to paper mill under construction near Snowflake.
Status: Planned.

ST. LAWRENCE GAS CO., Ogdensburg, N. Y.
Project: 75 miles of line near Cornwall, Ont., to Ogdensburg, N. Y.
Status: Approved by FPC.

TENNESSEE-CALIFORNIA GAS TRANSMISSION CO., Box 2511, Houston, Tex.
Project: 105-mile, 26-in. line from Humble's King Ranch via Kleberg, Brooks and Hidalgo counties to Mexican border to connect with Tennessee-Pemex line to California. Included are 69 miles of 12-in. and smaller laterals.
Status: Pending FPC decision.

TENNESSEE GAS PIPELINE CO., a division of Tennessee Gas Transmission Co., Box 2511, Houston 1, Tex.
Project: 7.4 miles, 12-in. gathering line, offshore Louisiana.
Status: Under construction.
Contractors: Sam Carline, Inc., laying contractor; Brown & Root, Inc., burying contractor.
Project: 18.5 miles, 12-in. gathering line, offshore Louisiana.
Status: Under construction.
Contractor: Brown & Root, Inc.
Project: 12.6 miles, 12-in. gathering line, offshore Louisiana.
Status: Under construction.
Contractor: Brown & Root, Inc.
Project: 20.6 miles, 12-in. gathering line, offshore Louisiana.
Status: Pending FPC approval.
Project: 13 miles, 20-in. gathering line, offshore Louisiana.
Status: Under construction.
Contractor: J. Ray McDermott, Inc.
Project: 6 miles, 12-in. gathering line, offshore Louisiana.
Status: Approved by FPC.

TENNESSEE GAS TRANSMISSION CO., Box 2511, Houston, Tex.
Project: 1,100-mile, 30-in. line Texas to California via Mexico (see Foreign).
Project: 292-mile line from the California-Mexican border to Los Angeles to tie in with above-mentioned line.
Status: Tennessee Gas' subsidiary, California Gas Transmission Co., and Southern California Edison Co. have applied to California PUC. Also pending FPC approval.
Project: A line from King Ranch, Texas, to the Mexican border, to connect with proposed line through Mexico to California.
Status: Tennessee Gas subsidiary, Tennessee California Gas Transmission Co., to build and operate the Texas segment.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1, Tex.
Projects: 165 miles of 20-in. from West Monroe, La., to Kosciusko, Miss.
Status: Under way.
Contractor: Houston Contracting Co., Pentzien, Inc.
Completion: 1961.
Project: 40 miles, 36-in., Station 26 to Station 27, N. J.
Status: Under way.
Contractors: H. C. Price Co., Napp-Grecco Co.
Completion: 1961.
Project: 89 miles, 30-in. Kosciusko station, Miss., and Station 21-A, Pa.
Status: Under way.
Contractors: Western Pipeline, Inc., Bechtel.
Completion: 1961.
Project: 40 miles, 30-in. Delmont station, Pa., to Station 26, N. J.
Status: Under way.
Contractor: Tulsa Williams Inc.
Completion: 1961.
Project: 45 miles, 30-in. Delmont station, Pa., to Station 26, N. J.
Status: Planned, filed with FPC.
Completion: 1962.
Project: 42 miles, 30-in., Kosciusko station, Miss., to Station 21-A, Pa.
Status: Temporary FPC approval.
Completion: 1962.
Project: 57 miles, 14-in., Castor, La., to West Monroe, La.
Status: Planned, filed with FPC.
Completion: 1961.
Project: 13 miles, 14-in. Middlesex County, to Barnardsville, N. J.
Status: Planned, filed with FPC.
Completion: 1962.
Project: 14 miles, 12 in., Barnardsville to Roseland, N. J.
Status: Planned, filed with FPC.
Completion: 1961.
Project: 11 miles, 10-in., Middlesex County to Helvetta, N. J.
Status: Planned, filed with FPC.
Completion: 1961.

TEXAS GAS TRANSMISSION CORP., Owensboro, Ky.
Project: 35 miles, 30-in. and 21 miles, 26-in. in Tennessee, Mississippi, Arkansas, Louisiana.
Status: Under way.
Contractor: Houston Contracting Co.
Project: 52 miles, 20-in., 16-in. and 8-in. from Bay Round, to Morgan City, La.
Status: Under way.
Contractor: Houston Contracting Co.

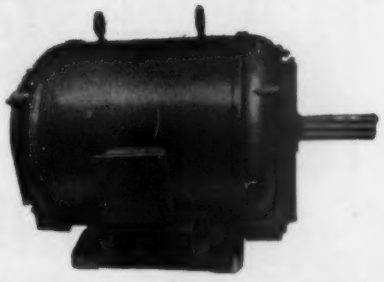
TRANSCONTINENTAL GAS PIPE LINE CORP., 3100 Travis St., Houston, Tex.
Project: 30 miles, 30-in. main-line loop, Texas.
Status: Approved.
Completion: 1961.

For Uninterrupted POWER FLOW in the OIL FIELDS

You Can Rely on

FIELDMASTER

ALL WEATHER
BALL BEARING MOTORS



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- VERMIN PROOFED
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TULSA, OKLAHOMA

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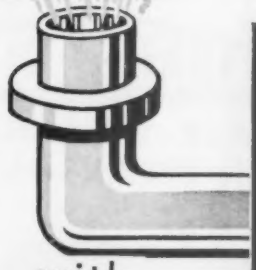

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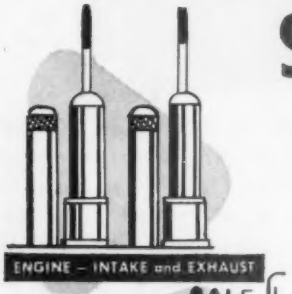

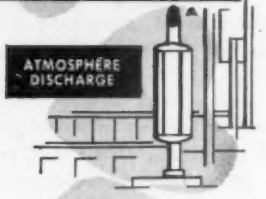

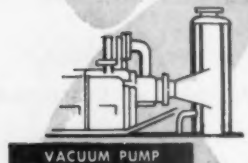

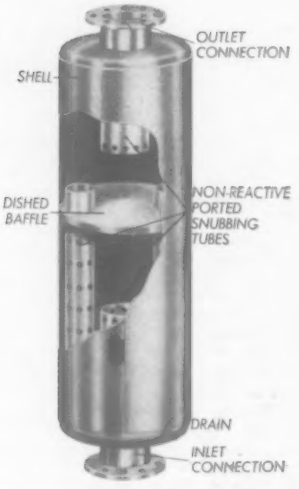

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REPRESENTATIVES WORLD WIDE

PIPELINE CONSTRUCTION

Contractor: Houston Contracting Co.
Project: 21 miles, 36:in. main-line loop, Mississippi.
Status: Approved.
Completion: 1961.
Contractor: C. S. Lenoir.
Project: 62 miles, 36-in. main-line loop, Alabama.
Status: Approved.
Completion: 1961.
Contractor: C. S. Lenoir.
Project: 39 miles, 36-in. main-line loop, Georgia.
Status: Approved.
Completion: 1961.
Contractor: Williams Brothers Co.
Project: 22 miles, 36-in. main-line loop South Carolina.
Status: Approved.
Completion: 1961.
Contractor: Williams Brothers Co.
Project: 15 miles, 36-in. main-line loop, North Carolina.
Status: Approved.
Completion: 1961.
Contractor: Williams Brothers Co.
Project: 7 miles, 16-in. main-line loop, New Jersey.
Status: Approved.
Completion: 1961.
Contractor: Conduit & Foundation Construction Corp.
Project: 12-in. Delaware River Crossing.
Status: Approved.
Completion: 1961.
Contractor: American Dredging Co.
Project: 6 miles, 36-in. main-line loop, Louisiana.
Status: Ttemporary authorization.
Completion: 1961.
Project: 44 miles, 36-in. main-line loop, Mississippi.
Status: Temporary authorization.
Completion: 1961.
Project: 22 miles, 36-in. main-line loop, Alabama.
Status: Temporary authorization.
Completion: 1961.
Project: 32 miles, 36-in. main-line loop, Georgia.
Status: Temporary authorization.
Completion: 1961.
Project: 21 miles, 36-in. main-line loop, South Carolina.
Status: Temporary authorization.
Completion: 1961.
Project: 14 miles, 36-in. main-line loop, North Carolina.
Status: Temporary authorization.
Completion: 1961.
Contractor: Williams Brothers Co.
Project: 22 miles, 36-in. main-line loop, Virginia.
Status: Temporary authorization.
Completion: 1961.
Contractor: Williams Brothers Co.
Project: 26 miles, 36-in. main-line loop, Maryland.
Status: Temporary authorization.
Completion: 1961.
Project: 153 miles, 3, 8, and 20-in. purchase laterals, offshore Louisiana.
Status: Temporary authorization.
Completion: 1961.
Contractor: Brown & Root.

TRANSWESTERN PIPELINE CO., 618 First City National Bank Building, Houston 2, Tex.
Project: Gathering system in West Texas and Oklahoma, approximately 100 miles, 4 to 6 in.
Status: Under way.
Contractor: Sheehan Pipe Line Construction Co.

TRUNKLINE GAS CO., Box 1642, Houston, Tex.

PIPELINE CONSTRUCTION

Project: 51.8 miles, 20-in., Kaplan to Foster, La.
Status: Under way.
Completion: November 1961.
Contractors: Grayco Constructors, Sam Carline, Inc.
Project: 9.6 miles, 30-in., Longville to Bundick, La.
Status: Pending FPC approval.
Project: 17.5 miles, 30-in., Rayville to Pioneer, La.
Status: Pending FPC approval.
Project: 22.1 miles, 30-in., Senatobia to Byhalia, Miss.
Status: Pending FPC approval.
Project: 21.6 miles, 30-in., Hinkleville, Ky., to Vienna, Ill.
Status: Pending FPC approval.
Project: 25.2 miles, 30-in., Neoga to Bourbon, Ill.
Status: Pending FPC approval.
Project: 27 miles, 10-in., Merryville to Longville, La.
Status: Pending FPC approval.
Contractor: Glaser Construction Co.
Project: 35-mile, 26-in. line, Cow Island to Jennings, La.
Status: Under way.
Contractor: Sharman, Allem, Gay & Taylor Inc.

UNITED GAS PIPE LINE CO., Box 1407, Shreveport 92, La.

★ Project: 216-mile, 30-in., from Bayou Sale Junction, St. Mary Parish, to West Monroe Junction, Ouachita Parish, Louisiana.
Status: Temporary FPC authorization.
Completion: Dec. 29, 1961.
Contractors: Panama, Inc., and Stanley-Bledsoe Corp.

★ Project: 59.15 miles, 36-in. from Bastian Bay field, Plaquemines Parish, to Lirette Terrebonne Parish, Louisiana.
Status: Temporary FPC authorization.
Completion: Mar. 10, 1962.
Contractor: Panama, Inc.

★ Project: 40-mile, 24-in. loop on Mobile-Pensacola line.
Status: Pending FPC approval.

★ Project: 10.2 miles, 30-in. loop in Terrebonne and Assumption parishes, Louisiana.
Status: Pending FPC approval.
Project: 217 miles of 30-in. from St. Mary Parish to near Monroe, La.
Status: Under way.
Contractors: Panama, Inc.;Stanley-Bledsoe, Inc.
Completion: Late 1961.

WASHINGTON GAS LIGHT CO., 1100 H St., NW, Washington 5, D. C.
Project: 16 miles of 24-in. from near Alexandria, Va., to Prince Georges County, Maryland.
Status: Approved by FPC.

WESTERN SLOPE GAS CO., Denver, Colo.

★ Project: 6 miles, 4-in., 1 mile, 6-in., West Douglas Creek gathering system.
Status: Planned.
Completion: Dec. 1, 1961.

U. S. Miscellaneous Pipelines

MONSANTO CHEMICAL CO., 800 North Lindbergh Blvd., St. Louis 66, Mo.
Project: 25-mile lines to move petrochemicals between proposed plant at Chocolate Bayou and Texas City.
Status: Planned.

SUNOLIN CHEMICAL CO., 1608 Walnut St., Philadelphia 3, Pa.
Project: Ten 8-in. chemical lines from SunOlin's plant at Claymont, across the Delaware River to Penns Grove, N. J.
Status: Under way.
Completion: Late 1961.

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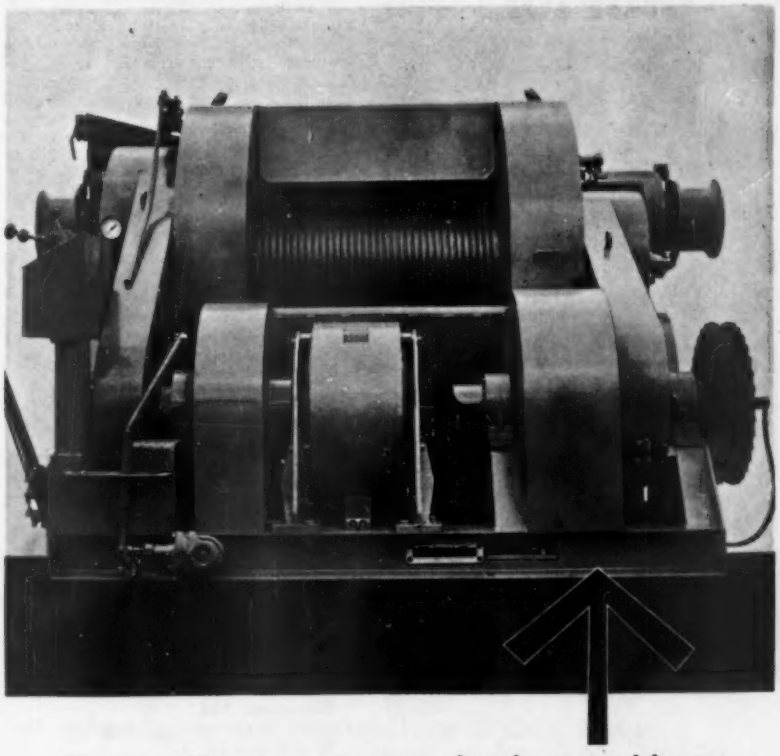
good designs made better with aluminum



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☐ 68-10460 *Process Industries Applications of Alcoa Aluminum*
☐ 03-19122 *Alcoa Structural Handbook*

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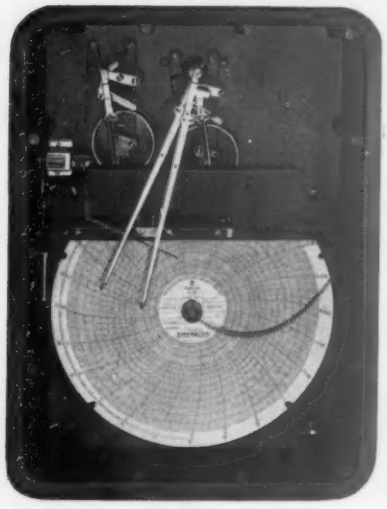
INTEGRATING ORIFICE METERS



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AMERICAN METER COMPANY

Sales Offices in Principal Cities

PIPELINE CONSTRUCTION

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1, Tex.
Project: 350 miles of 24-in. coal-slurry line to move West Virginia coal to electric companies in Pennsylvania, New York and New Jersey. (Texas Eastern is working jointly with Consolidation Coal Co., Pittsburgh, Pa.)
Status: Proposed.

U. S. DEPARTMENT OF INTERIOR, Washington, D. C.
★ Project: 400-mile, 4 to 10-in. crude helium line from Bushton, Kans., to Cliffside storage area near Amarillo, Tex.
Status: Planned.
Contractor: Engineering contract to Williams Brothers Co.

Canadian Crude Oil Pipelines

BRITISH COLUMBIA OIL TRANSMISSION CO., Taylor, B.C.
Project: 85-mile, small-diameter gathering system in Blueberry field with transmission line to Taylor.
Completion: December 1961.

FEDERATED PIPE LINES LTD., 304 Sixth Ave. West, Calgary, Alta., Canada.
Project: 10 miles, 4½/6⅝-in. gathering lines.
Completion: Indefinite.

GIBSON PETROLEUM CO. LTD., Calgary, Alta., Canada.
★ Project: 33 miles, 4½-in. crude line from Hamilton Lake to Bellshill Lake.
Completion: Dec. 1, 1961.

HUDSON'S BAY OIL & GAS CO., LTD., 320 7th Ave., Calgary, Alta.
Project: 10 miles, 6-in., Waterton to Pincher Creek, 29.3 miles, 8-in., Pincher Creek to Carway to connect with Glacier system in U. S.
Status: Pending CNEB approval.

INTERPROVINCIAL PIPE LINE CO., Edmonton, Alta.
Project: 90-mile lateral, Hamilton, Ont., to Buffalo, N. Y.
Status: Filed with CNEB.

MATADOR PIPE LINE CORP., Denver, Colo.
Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Approved by CNEB.
Completion: Dec. 31, 1961.

PEACE RIVER OIL PIPE LINE CO. LTD., Box 130, Calgary, Alta.
Project: 161-mile, 12-in. from Kaybob area to Edmondton with 7.5-mile, 8-in. lateral to Windfall.
Status: Under way.
Completion: Late 1961.

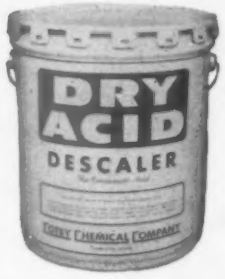
RANGELAND PIPE LINE CO., Calgary.
Project: 111-mile line from Cessford field to Calgary.
Status: Pending approval of Alberta government.

RIMBEY PIPE LINE CO., Box 130, Calgary, Alta., Canada.
★ Project: 65-mile, 8-in. condensate line from Rimbey gas plant to Edmonton.
Status: Under construction.
Completion: Nov. 1, 1961.

ROYALITE OIL CO., LTD., Calgary, Alta.
Project: 26.5 mile, 8-in. Jumping Pound and Wildcat Hills absorption plants to Valley Pipe Line near Calgary.
Status: Bids called for Oct. 31.

TEXACO EXPLORATION CO., Calgary, Alta., Canada.
Project: 22.2 miles 8⅝-in. loop on Rimbey-Westrose section of existing line.
Status: Pending Alberta Conservation Board approval.

DRY ACID DESCALER



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PIPELINE CONSTRUCTION

TRANS-PRAIRIE PIPELINES, LTD., 12912 125 Ave., Edmonton, Alta.
★ Project: 48-mile, 6⅝-in. crude line from Worsley field to connect with existing company line to Taylor, B. C.
Status: Pending provincial authorization.
Project: Expansion of gathering system in British Columbia, 40 miles, 4-in. from Taylor to Dawson Creek; 30 miles, 6-in. from Boundary Lake to Taylor. 75 miles, 8-in. from Taylor to Milligan Creek, 11 miles, 4-in. from Milligan Creek to West Beaten; and 4 miles, 8-in. near Taylor station.
Status: Under way.
Contractor: Banister Construction Co., Ltd., Edmonton.
Completion: Fall, 1961.

WESTERN PACIFIC PRODUCTS & CRUDE OIL PIPELINES, LTD., 1155 West Georgia St., Vancouver 5, B. C.
Project: 500-mile, 12-in. from Taylor, B. C., to Kamloops to connect with the Trans Mountain line to Vancouver.
Status: Under way.
Contractors: Canadian - Bechtel, north; Dutton-Williams, south.
Completion: Late 1961.

Canadian Natural Gas Pipelines

ALBERTA GAS TRUNK LINE CO., LTD., Calgary, Alta.
Project: 226 miles of 36-in. and 125 miles of 30-in., plus laterals in southern Alberta including 58 miles of 22-in. and 64 miles of 16-in. (Part of a 1,400-mile system Alberta to San Francisco.)
Contractors: Majestic Contractors, Ltd., Edmonton, haas 113 miles of 36-in. from Crowsnest Pass to Priddis, 63 miles of 30-in. from Rocky Mountain House to Cynthia, and 38 miles of 22-in. lateral to the Rimbey region. Mannix Co., Ltd., Calgary, has 113 miles of 36-in. from Priddis to Rocky Mountain House. Dutton-Williams Brothers, Ltd., Calgary, has 62 miles of 30 in. from Cynthia to near Whitecourt, Alta., as well as a 20-mile, 22-in. lateral to the Whitecourt area. Piggott Construction, Ltd., Edmonton, has 64 miles of 16-in. lateral from Crowsnest Pass to Carway, Alta., on the U. S. border.
Projects: Laterals to tie in with the above project: 15 miles of 12-in. to Buck Lake, 23 miles of 22-in. to East Calgary, 15 miles of 16-in. to Carstairs, 4 miles of 8-in. to Sarcee, and 10 miles of 10-in. built will connect Kaybob, Berland River, Lovett River, and Stolberg.
Completion: Dec. 1961.

ALBERTA NATURAL GAS CO., LTD. (Pacific Gas & Electric Co., San Francisco, and Westcoast Transmission, Calgary.)
Project: 108 miles of 36-in. from Crowsnest Pass across southeastern British Columbia to the U. S. border near Eastport, Idaho. (Part of 1,400-mile project from Alberta to San Francisco.)
Contractor: Price Poole of Canada, Ltd. (Canadian Bechtel, Inc., Toronto, is engineering manager.)
Completion: Dec. 1961.

CARTIER GAS CORP. (St. Maurice Gas Inc., and Consumers Gas Co., 19 Toronto St., Toronto.)
Project: Transmission and distribution in eastern townships and through to Quebec City in Quebec Province.
Status: Proposed.

GAS TRUNK LINE OF BRITISH COLUMBIA, LTD., Pacific Bldg., Calgary, Alta.
Project: 245-mile, 30-in. extension of West-

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At Oak Ridge National Laboratory, a cooling system utilizing aluminum forces more than 12,000 gal of water per minute through the research reactor. Welding fittings up to 24 in., thought to be the world's largest of aluminum, were made with Alcoa® Aluminum by Tube Turns Division of Chemetron Corporation, Louisville, Ky. Aluminum was selected to maintain purity of the demineralized water. Other advantages: aluminum's low cost, corrosion resistance and superior heat-transfer ability. To take advantage of Alcoa's 35 years of heat exchanger experience, please send the coupon.

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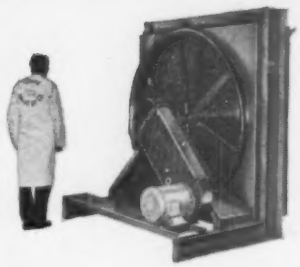

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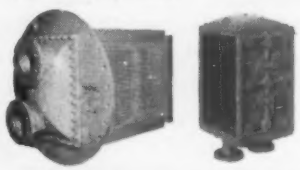

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RACINE, WISCONSIN
Plants at Racine, Wis. and Mattoon, Ill.

PIPELINE CONSTRUCTION

coast Transmission system from Taylor, B. C., to Fort Nelson.
Status: Delayed to 1963 or 1964.

MAGNA PIPELINE CO., LTD., Nanaimo, Vancouver Island, B. C.
Project: 53 miles of parallel 7-in. reinforced plastic pipe to serve Vancouver Island, B. C.
Status: Approved.
Completion: 1963.

NORTHERN ALBERTA PIPE LINES, LTD., Edmonton, Alta.
Project: 110-mile trunk line, plus gathering system, from Las La Biche, in McMurray vicinity, to Edmonton.
Status: Pending provincial approval.

SASKATCHEWAN POWER CORP., Regina, Sask.
Project: 88 miles, 14-in., Hatton to Success, Sask.
Status: Under way.
Completion: Nov. 1, 1961.
Contractor: Robb Construction.
Project: 35-mile, 4 and 6-in. line, Canora to Sturgis.
Completion: 1961.

SARATOGA PROCESSING CO., LTD., 406 Petroleum Building, Calgary, Alta.
Project: 67-mile gathering system (43 miles 16-in., 24 miles 4-10-in.) for Coleman, Alta., processing plant.

WESTCOAST TRANSMISSION CO., LTD., Calgary, Alta.
Project: 688-mile, 30-in. loop of British Columbia-Washington line.
Status: Proposed.
Project: (See Alberta Natural Gas Co., Ltd., for joint project.)

Foreign Crude Oil Pipelines

ABU DHABIE MARINE AREAS, LTD. (partly owned by British Petroleum Co., Britannic House, Finsbury Circus, London E.C. 2).
Project: 20 miles of 18-in. from offshore Persian Gulf pool to Das Island.

ARABIAN AMERICAN OIL CO., 505 Park Ave., New York 22.
Project: 30-mile, 24-in. Safaniya offshore gathering line.
Status: Under way.
Completion: January 1962.
Project: 27-mile, 24-in. crude line from northern Safaniya to southern Safaniya.
Status: Planned.
Completion: Second quarter 1962.
Contractor: Aramco-Bechtel.

BASRAH PETROLEUM CO., London, England.
Project: 37-mile line from Rumalia field to power plant at Basra.
Status: Contract let.
Completion: March 1962.
Contractor: SAIPEM.

CIE. de RECHERCHE et d'EXPLOITATION PETROLIERE au SHARA, Paris.
Project: 40 miles, 4-8-in. gathering lines, El Adeb Larache field.
Status: Proposed.
Contractor: Socoman.
Completion: January 1962.

COUNCIL FOR MUTUAL ECONOMIC AID (Comecon).
Project: 2,800-mile system from the Volga-Ural oil fields in Russia to East Europe satellite countries.
Status: Construction under way in Poland, Hungary, and Czechoslovakia.

EMPRESA NACIONAL CALVO SOTELO, General Pardenas 55, Madrid, Spain.
Project: 150-mile, 14-in. Malaga to Puertollano.
Status: Planned.
Completion: 1962.

ENI, Milan, Italy.
Project: Central European System, 325 miles, 22-26-in., 300 miles, 14-18-in. from Genoa, Italy, to Aigle, Switzerland, to Ulm, Germany, with branches to Ingolstadt and Stuttgart.
Status: Under way.

IRANIAN OIL EXPLORATION & PRODUCING CO.
Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bander Mashur line.
Status: Planned.

IRAQ PETROLEUM CO.
Project: Two 25-mile. 32-in. crude lines to offshore loading dock in Persian Gulf.
Status: Under way.

IRAQ PETROLEUM CO., LTD., 214 Oxford St., London W 1, England.
Project: Looping of Kirkuk-Mediterranean system 66-mile between K-1 and K-2 stations and 81-mile between K-3 toward Syria. In Syria, a 28-mile section of 30-in. is under way.

KUWAIT OIL CO., LTD., Burgan House, London, England.
Project: 31-mile, 24-in. crude line from Minagish to Ahmadi South tank farm.
Status: Planned.
Completion: Mid-1962.

MENE GRANDE OIL CO., Apartado 709, Caracas, Venezuela.
Project: 16-in. line at Block 11, Maracaibo.
Completion: December 1961.

NATIONAL IRANIAN OIL CO., Teheran, Iran.
★ Project: Natural gas line from Sarajeh field to Teheran.
Status: Proposed.

OASIS OIL CO. OF LIBYA, 1270 Avenue of the Americas, New York 20, N. Y.
Project: 86-mile, 30-in. from Dahra field to El Sider; 36-mile, 20-in. from Mabruk to 30-in. line.

OIL INDIA, LTD., (Burmah Oil Co. and Assam Oil Co., two-thirds, and India Government, one-third.)
Project: 720 miles in northeast India, 250 miles of 16-in. from Nahorkatiya to Noonmati and 470 miles of 14-in. from noonmati to Barauni.
Contractors: Mannesmann, Germany, and SAIPEM, Italy.
Status: Under way.
Completion: 16-in. system, 1961.

PETROLEO BRASILEIRO S.A. (Brazil).
Project: 250-mile line from Rio de Janeiro to Belo Horizonte refinery site.
Status: Under consideration.
Project: 35 miles of 8 to 12-in. pipe from Buracica to Candeia.
Contractor: Techint, Inc., Milan, Italy.
Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.
Status: Planned.

PHILLIPS PETROLEUM CO., Bartlesville, Okla.
Project: 14-in. line in Block 17, Lake Maracaibo, Venezuela.
Status: Planned.
Contractor: Chicago Bridge & Iron Co.

RHEIN-DONAU OELETUNG, G.m.b.H., Germany.
Project: Extension of South European Pipeline from Karlsruhe to Ingolstadt.
Status: Proposed.

ROYAL DUTCH-SHELL.
Project: 12-mile line from Gore Bay, Australia, to Royal Dutch-Shell's Clyde refinery.
Status: Planned.
Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Sumatra.
Contractor: Williams Brothers Overseas, Ltd., Tulsa, and John Brown, Ltd., London.
Completion: January 1, 1962.

PIPELINE CONSTRUCTION

SINCLAIR VENEZUELAN OIL CO., Apartado 1706, Caracas. Venezuela.
Project: 17.35 miles, 8-in. crude line from East Aguasay to south bank of Tonoro River to connect with existing 8-in. line.
Status: Planned.
Completion: Late 1961.

SNAM-SUEDPETROL, Milan, Italy.
Project: 20-in. crude line from Genoa to Ingolstadt, Austria, via Switzerland.
Status: Planned. Construction expected to begin in 1961.

SOUTH EUROPEAN PIPELINE CO. (Jersey Standard, Caltex, Shell, British Petroleum, and 12 other firms.)
Project: 419-mile, 30 in. line from Lavera, near Marseille, to Strasbourg, with 40-mile extension to Karlsruhe, Germany. This may be extended into lower Batavia with a 155-mile, 22-in. segment.
Status: Under way.
Completion: 1963.

SYRIAN GOVERNMENT, Damascus.
★ Project: 470-mile, 16-in. crude line from Qarah Shuk field to Mediterranean port.
Status: Proposed.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: 2,315-mile, 28-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields, Bashiria, to Irkutsk.
Status: Under way.

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 390 miles, 14-in. from Neuquen Province to Bahia Blanca.
Status: Under way.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

Foreign Products Pipelines

ARABIAN AMERICAN OIL CO., Dhahran, Saudi Arabia, and 505 Park Avenue, New York.
Project: 37 miles of 8-in. LPG line from Abqaik to 'Ain Dar.
Contractor: Aramco-Bechtel.
Completion: 1961.

BRITISH PETROLEUM CO., London.
Project: 12-mile, 4-6-in. from sealoading line to air terminal on Bahrain.
Contractor: Mothercat.

INDIA GOVERNMENT.
Projects: 600-mile line from Barauni to Delhi via Kanpur, Lucknow, and Allahabad; 300-mile dual crude and products line from Bombay to Bhusaval; 120-mile products line from Bombay to Poona to be extended 300 miles, later, to Hyderabad; and a 350-mile products line from Cochin to Madras via Bangalore.
Status: Proposed.

NATIONAL IRANIAN OIL CO., Tehran, Iran.
Project: 360 miles of 8-in. from Rey to Meshed, Iran.
Status: Under way.
Contractor: William Brothers, Tulsa.

PETROLEOS MEXICANOS, Avenida Juarez 92-94, Mexico City, Mexico.
Project: 350-mile, 12-in. Minatitlan to Mexico City.
Status: Planned.
Completion: December 1962.
Project: 270 miles of 8-in. from Torreon

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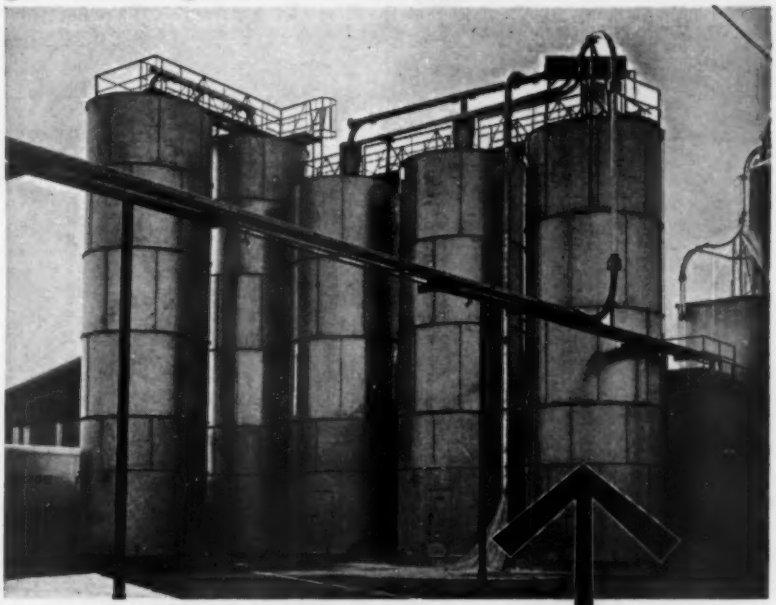

Butler aluminum tanks prevent product contamination at Dow Chemical's Saginaw Bay Division

This aluminum storage installation maintains product purity for the polychemicals department of Dow Chemical Co., Bay City, Mich. Used for polystyrene, polypropylene or polyvinyl chloride, these bolted tanks were fabricated of ALCOA® Aluminum by the Bulk Storage Division of Butler Manufacturing Co., Kansas City, Mo. Many sensitive chemicals and oils are handled today in aluminum to avoid product degradation or decomposition. Moreover, low initial cost and no maintenance make aluminum an economical investment. We'd like to send you more information. Please mail the coupon.

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

Aluminum Company of America, 826-Q Alcoa Building, Pittsburgh 19, Pa.
Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries:

- ☐ 34-10197 Aluminum Pipe and Fittings
- ☐ 34-10418 Alcoa Unitrace: Combines Piping and Tracing in One Unit
- ☐ DD-514 Alcoa Duotrace Technical Report
- ☐ 68-10460 Process Industries Applications of Alcoa Aluminum
- ☐ 50-19415 Welding Alcoa Aluminum

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Phone: BRidge 4-3141

PIPELINE CONSTRUCTION

to Chihuahua.
Status: Under way.
Completion: February 1962.

PIPELINES OF PUERTO RICO, San Juan.
Project: 95 miles 8-in. from Penuelas to Catano.
Status: Approved by PSC.

SYRIAN PIPELINE.
Project: About 316 miles, 6-in. from Homs to tank farms in the Damascus, Aleppo, and Latakia areas.
Status: Under way.
Completion: 1962.
Contractor: Technit.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: 2,315 miles of 29-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields in Bashira to Irkutsk.
Status: Under way.
Project: 700 miles from Novo-Kuibyshev refinery to Bryansk.
Status: Under way.

YACIMIENTOS PETROLIFEROS FISCIALES (Argentina), Buenos Aires.
Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Planned.

Foreign Natural Gas Pipelines

GAS DEL ESTADO (Argentina), Buenos Aires.
Project: 1,050-mile line from Comodoro Rivadavia to Buenos Aires with a spur ta Plaza Huincul field in Neuquen Province. Line will be 26 in. to Plaza Huincul and 30 in. to Buenos Aires.
Contractor: Saipem-Siderexport.

GASES NATURALES DE COLOMBIA, S.A. (Owned 50% by Colombian Petroleum Co., is affiliated with Mobil International and Texaco, and 50% local.)
Project: 140 miles of 10-in. from Cicuo field to Barranquilla.
Completion: Late 1961.

INTERNATIONAL GAS CO., Los Angeles, Calif.
Project: 1,840-mile, 30-in. gas line from Reynosa to Mexicali via Monterrey, Mazatlan, etc.
Status: Proposed.

ISRAEL GOVERNMENT and private interests.
Project: 75 miles of 16-in. to power a plant at Ashdod Yam on the Mediterranean coast.
Status: Planned.

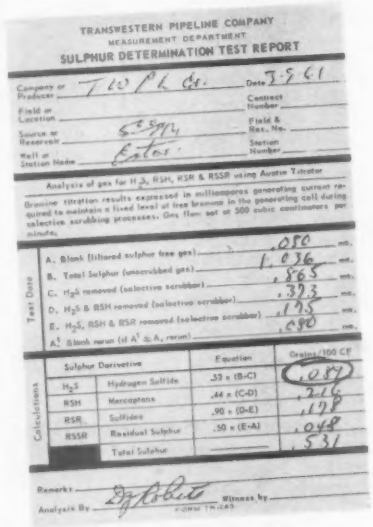
NIOGAS, Vienna, Austria.
Project: 82 miles of 8 and 10-in. to connect Traismauer and Amstetten in Austria.
Contractor: Williams Brothers, Tulsa.

PAKISTAN INDUSTRIAL DEVELOPMENT CORP.
Project: 1,000-mile system from Sui field to Lyallpur, Lahore, Daudkhel, Islamabad, Rawalpindi, and Wah. This would require a loop to an existing 310-mile 16-in. line from the Pakistan petroleum field to Multan.
Status: Proposed.

PAKISTAN PETROLEUM CO.
Project: 145 miles of 8-in. from Sylhet field to Daccq, East Pakistan.
Status: Proposed.

PETROLEOS MEXICANOS, Avenida Juarez 92-94, Mexico City, Mexico.
Project: 270 miles of 12-in. from Torreon

Maloney-Crawford Solves Another Sour Gas Problem


TRANSWESTERN PIPELINE COMPANY
MEASUREMENT DEPARTMENT
SULPHUR DETERMINATION TEST REPORT

Company or Producer: T W P L Co. Date: 7-5-61
Field or Location: Contract Number:
Source or Reservoir: Eater Field & Res. No.:
Well or Station Name: Station Number:

Analysis of gas for H_2S, RSH, RSR & RSSR using Austin Titrator
Bromine titration results expressed in milliamperes generating current required to maintain a fixed level of free bromine in the generating cell during selective scrubbing processes. Gas flow set at 500 cubic centimeters per minute.

Test Data

A. Blank (filtered sulphur free gas)	.050	ma.
B. Total Sulphur (unscrubbed gas)	1.036	ma.
C. H_2S removed (selective scrubber)	.865	ma.
D. H_2S & RSH removed (selective scrubber)	.323	ma.
E. H_2S, RSH & RSR removed (selective scrubber)	.195	ma.
A¹ Blank rerun (if A¹ ≠ A, rerun)	.090	ma.

Calculations

Sulphur Derivative		Equation	Grains/100 CF
H_2S	Hydrogen Sulfide	.52 x (B-C)	.087
RSH	Mercaptans	.44 x (C-D)	.216
RSR	Sulfides	.90 x (D-E)	.128
RSSR	Residual Sulphur	.50 x (E-A)	.048
	Total Sulphur		.531

Remarks:
Analysis By: D. Roberts Witness by:

TRANSWESTERN PIPELINE CO.'S PROBLEM: 100 grains H_2S/100 CF in an 18MM-SCF/D stream.

THE REQUIREMENT: Reduce H_2S to .25 grains/100 CF.

MALONEY - CRAWFORD SOLUTION: An automated Sweet-A-Mine gas treating plant with ratio-rate control system.

THE RESULTS: The Sweet-A-Mine reduced the H_2S content to .089 grains/100 CF. The actual field report on the Sweet-A-Mine's performance is reproduced above.

CONCLUSION: If you have a sour gas problem, call on M-C. You'll get a sound solution.

Maloney-Crawford
Designers and Manufacturers of
Processing and Production Equipment
Box 659 Tulsa

to Chihuahua.
Status: Under way.
Completion: December 1961.

SOC. SICILIANI METANDOTTI (SOSIM).
Partners include Edison Power, Italcementi, Fiat Motor, Sicilian SGES Power, Bombrini Parodi Delfino Chemical, and Montecatini.
Project: 560 miles from Hassi R'Mel gas field, Algeria, to Cape Bon, Tunisia, 77 miles across the Sicilian Channel, into northern Italy and beyond.
Status: Engineering studies under way.

STANDARD - VACUUM OIL CO., New York.
Project: 60 miles of 10-in. from Radja field to Palembang, Sumatra, to supply fertilizer plant planned by the government.
Status: Planned.
Completion: 1962.

SYRIAN LINE.
Project: 316 miles of 6-in. from Homs refinery to Damascus, Aleppo and Latakia.
Status: Under way.
Contractor: Techint, Inc., Milan, Italy.
Completion: Late 1962.

TEIKOKU OIL CO. and **TOKYO GAS CO.**
Project: 200-mile, 12-in. system from Kubiki gas field.
Status: Proposed.

TRINIDAD & TOBAGO ELECTRICITY COMMISSION, Port - of - Spain, Trinidad.
Project: 42-mile, 16-in. gas line from Penal fields to Port-or-Spain.
Status: Planned for 1962.

TENNESSEE GAS TRANSMISSION CO., Box 2511, Houston, Tex.
Project: 1,100-mile, 30-in. line from Reynosa, to San Luis Rio Colorado, near the California border.
Status: Pending FPC, California PUC approval.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: New line from gas fields in western Ukraine to the Polish border.
Status: USSR has signed agreement with Poland.
Project: 250-mile line from Ust-Vilyuisk field to the Siberian cities of Yakutsk and Pokrovsk, plus feeder lines to supply villages in the Lena River Valley.
Status: Planned.
Completion: Date not set yet.
Project: Two parallel, 40-in. lines, each over 1,300 miles long, from Gazli, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Planned.
Project: From Tashkent to Chimkent, Dzhambul, Frunze and Alma-Ata near Chinese border.
Completion: By 1965.
Project: Line from Berezovo field southward to Sverdlovsk.
Status: Proposed.
Project: Line from Minsk northward to Baltic Sea area.
Completion: To Vilnius, Lithuania, in 1961; to Riga, Latvia, in 1962.
Project: Line from Minsk northeast to Leningrad.
Status: Proposed.
Project: 800-mile, 40-in. line from Krasnodar fields north of Caucasus Mountainsto Serpukhov, south of Moscow, via Rostov and Luganak.
Status: Under way.
Project: 310 miles of 32-in. line ringing Moscow at radius of about 50 miles.
Status: Under way.
Completion: 1962.

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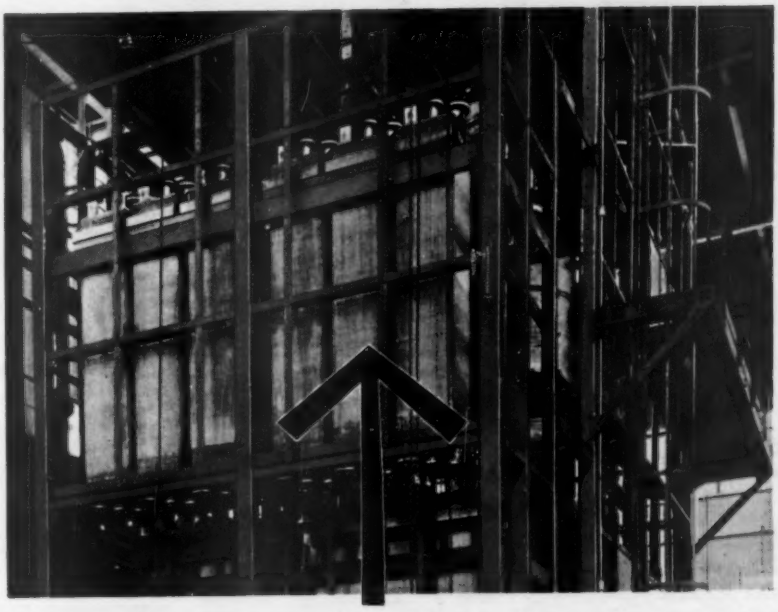

Air Reduction designed liquid oxygen plant around Trane Brazed Aluminum Heat Exchangers

Trane Brazed Aluminum Heat Exchangers, made with Alcoa sheet and fin stock, comprise the heart of Air Reduction Sales Company's liquid oxygen plant at Butler, Pa. In the cold box (shown), air and nitrogen streams are reversed on a regular cycle to clean up condensed water, ice, CO_2 and other impurities. Excellent ductility at extremely low temperatures, high thermal conductivity and ease of fabrication make Alcoa® Aluminum alloys ideal for oxygen plant service. Adaptable to joining by welding methods and by brazing, aluminum is easily fabricated into complex heat exchanger assemblies. Please send coupon for more information.

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Aluminum Company of America, 826-QQ Alcoa Building, Pittsburgh 19, Pa.

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☐ 42-20849 *Resistance of Aluminum Alloys to Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres*
☐ 88-11453 *Solving Refinery Corrosion Problems with Aluminum*
☐ 34-11566 *Alcoa Aluminum Heat Exchanger Tubes*
☐ 88-11251 *Cryogenic Applications of Alcoa Aluminum*

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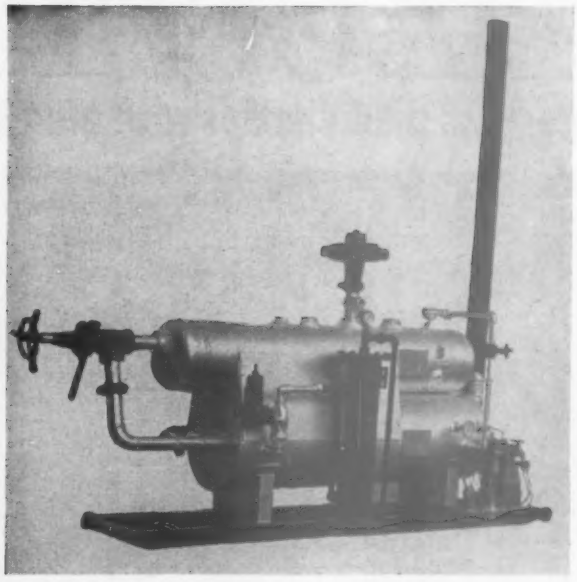
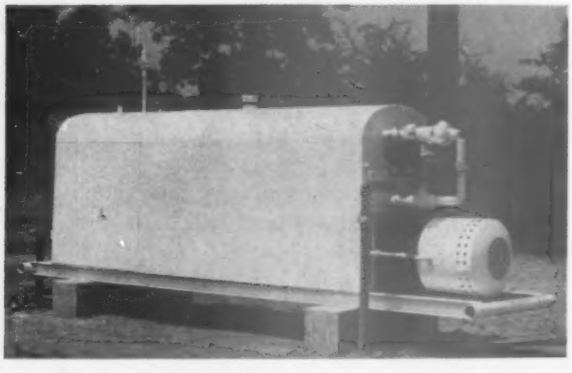
Want more facts about equipment or copies of product literature described in this issue?
Send this coupon
to manufacturer at address shown after each item.
Product name, Model no., literature title or number: _____
Described in OIL AND GAS JOURNAL issue of October 30, 1961
NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____



Skid-mounted heater-separator

THIS new production unit designed for small wells consists of a skid-mounted horizontal separator with heated liquid section and an indirect heater. To heat the liquids in the separator, the designer has placed two vessels so they touch along their full length.

Called the Windbreaker, the unit features shields which are used to increase the heat transfer in cold weather from heater to separator and which are removable for warm weather. Source: **Panhandle Steel Products Co.**, P. O. Box 1314, Wichita Falls, Tex.



New packaged heater-separator for gas-condensate wells

SALES GAS is delivered automatically at constant contract temperature with this new packaged heater-separator production unit designed for gas-condensate wells, called the Conpact. The unit is constructed so that the fuel scrubber is mounted on the inside where it is protected from the weather.

Operating parts are totally enclosed and conveniently located within heated, insulated areas which protect lines and sensitive instruments from both severe weather and from dirt. No separate building or fencing is required to protect the unit from either weather or livestock.

According to the manufacturer, the new unit requires less ground space than older types. In addition, the skid-mounting method, with the skids as an integral part of the unit, makes installation convenient. Source: **Continental Tank Co.**, Box 5038, Farley Station, Oklahoma City, Okla.

●

Latest paraffin inhibitor

When paraffin has accumulated in lines and tank bottoms, a new paraffin inhibitor may help get rid of it and prevent its deposition. The paraffin inhibitor, an organic formulation, promises to be effective for preventing deposits in tubing, flow lines, pipelines, and gas-lift wells, and for dropout in hydraulic systems.

The inhibitor is in liquid form and is soluble in crude oil but insoluble in water. The maker says it contains no chlorinated hydrocar-

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TOOL JOINT COMPOUND
"POLARIZED"

additive increases "clinging" power for greater thread protection under mud and water pressures!

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This new edition of The Journal's Annual Directory brings you the results of recent surveys of the processing side of the oil and gas industry. The surveys cover installations in the U. S., Canada, Western Europe, and the Middle East. It brings you the facts.

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Full 2" capacity. Plenty of power for up to 12" geared tools. Universal Die Head included threads ½" to 2" pipe and conduit with just two sets of dies. Four other styles of heads available . . . ⅛" to 2" pipe or conduit, ¼" to 2" bolts. Fast hand-action RIDGID Speed Chuck. Cam-Action Rear-Centering Workholder. Automatic re-circulating oil system. Easy-to-Read Length Gauge.

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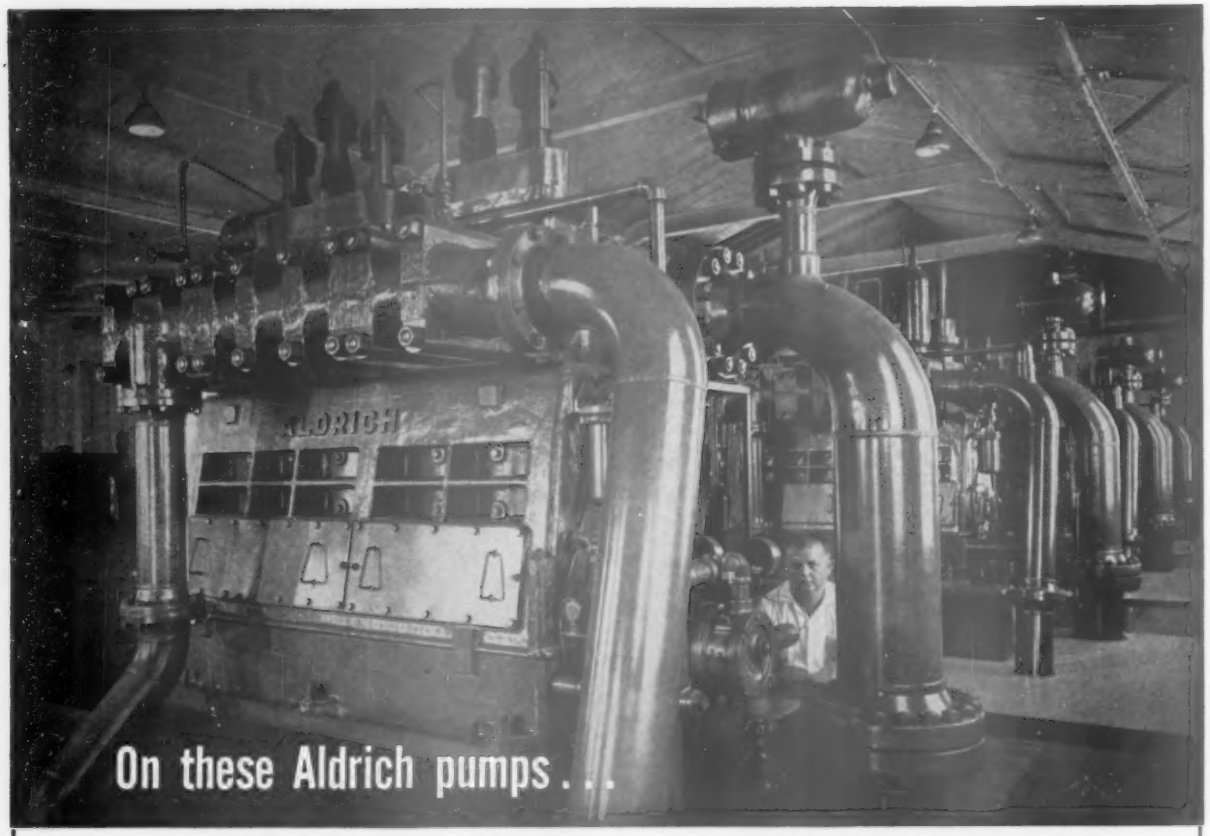


GULF OIL REPORTS 6 YEARS OF CONTINUOUS SERVICE WITH MINIMUM MAINTENANCE

FIELD REPORT

FLOOD: Goldsmith-San Andres Unit
OPERATOR: Gulf Oil Corporation
PUMPS: 4 Aldrich Quintuplex
FLOODING STARTED: October, 1954
EXPERIENCE TO DATE:

After six years, three pumps operate 24 hours a day, delivering some 54,000 bbl/day of sour oil field brine at 750 to 800 psi. Station designed for automatic operation. All maintenance handled by one man during eight-hour work day.

Field Parts stock available in Houston, Odessa, Alice and Wichita Falls, Texas; Casper, Wyo.; Hobbs, N.M.; Carmi, Ill.; Charleston, W. Va., Tulsa, Okla.; Los Angeles, Calif.; Calgary, Ontario. For further information write the ALDRICH PUMP COMPANY, 9 Gordon Street, Allentown, Pa.

the tough pumping problems go to ALDRICH

bons, heavy metals, or other ingredients known to be harmful to refinery processes. It may be stored outdoors. Source: **Hagan Chemicals & Controls, Inc.,** Hagan Center, Pittsburgh 30, Pa.

●

Pressure switch for 12,000 psi.

A bourbon - tube type of pressure switch has been brought out that is available in five classes of adjustable range providing a choice of pressure settings from 50 to 12,000 psi. It has a set and reset accuracy of +0.5%, single-setting and dual-control stripped switches from the basic unit to which standard or explosionproof housings are added to suit specific needs.

All housed switches are equipped with integral terminal blocks for wiring conveniences. The explosionproof housings have built-in potting wells. Source: **Barksdale Valves,** 5125 Alcoa Ave., Los Angeles 58, Calif.

●

Large-diameter fin tube

Diameters of 1 to 6 in. can be obtained in this K-Fin tubing designed specially for use in the convection sections of furnaces heating petrochemicals or hydrocarbons for processing. Available with two to eight fins per inch, the tubing can also be useful in waste-heat boilers and for tank heating. It is claimed to provide 10 times more outside surface area per foot of length than plain bare pipe or tubing.

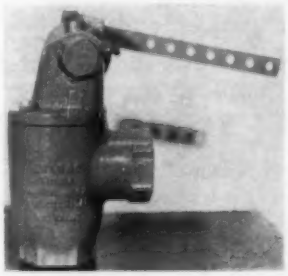
In the construction of the tubing, the helical fins are wrapped tightly into grooves plowed on the outside of the tube or pipe. The metal displaced by the grooves is then forced tightly against the sides of the fins to form a tight metal-to-metal bond. The tubes are available with carbon or alloy-steel fins on carbon or alloy-steel pipe or tubing. Source: **Griscom - Russell Co.,** 185 Wetmore Ave., S.E., Massillon, Ohio.

Hydraulic-snubber workover unit

ANY OPERATION normally done with a workover rig or snubbing equipment can now be performed under complete pressure control with a new hydraulic-snubber type of workover unit. One major advantage of the unit is that rigging up of the unit and snubbing or workover operations, including rotation of the pipe, can be performed without a derrick or draw works.

The hydraulic snubber comes in three sizes with pulling capacities of 75,000, 95,000, and 112,000 lb. and providing snubbing forces of 50,000, 76,000, and 90,000 lb. The units permit handling 20 to 30 joints of 30-ft. pipe per hour. They handle tubing sizes of 2 1/16 to 2⅞ in. and have a stroke length of 4 ft. to 4 ft. 8 in.

The unit is designed so all controls are centralized in one console permitting the operator to have within his reach complete control of pipe movement, blowout preventers, circulating and bleedoff valves, power swivel operations, and circulating pump. Gages indicate weight or snubbing force, well pressure, and pressure to the hydraulic components. The skid - mounted diesel power supply with hydraulic fluid and fuel tanks can be located at a distance from the well for increased safety. Source: **Brown Oil Tools, Inc.,** 8490 Katy Rd., Houston, Tex.

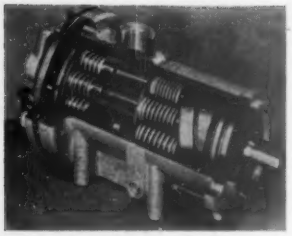


New valve for fluid control

A mechanical oil valve has been brought out for use in fluid control on oil and gas separators, horizontal emulsion treaters, and water knockouts. The Series 4600 dump valve is operated by a float located in the vessel and mechanically linked to a lever actuator on the valve.

Float movement transmitted through the mechanical linkage actuates the valve. The diaphragm balances the seat area and equalizes vessel fluid pressure and downstream pressure.

The maker says the valve is easily and positively actuated by the float as the inner mechanism and diaphragm pressures are equalized. By removing the cap screws, you can remove the entire inner valve mechanism for reworking or reversing the valve disk and replacing it. The valve comes in a 2-in. size with screwed ends and 3 and 4-in. sizes with flanged ends. Source: **Enardo Mfg. Co.,** 2727 Sand Springs Rd., Tulsa, Okla.



Variable-displacement pump

An axial piston type of variable-displacement hydraulic pump has been developed that promises to prove useful in a variety of industrial and mobile applications. The pump features a balanced cylinder block and wobble type of reaction plate design which the maker claims virtually eliminates pumping forces from the displacement-changing mechanism. Reaction pistons serve to balance the hydraulic forces exerted on the cylinder block during pumping.

The Type WO7 pump is designed to meet JIC and SAE design specifications. Its nominal output rating is 9 g.p.m. at 3,600 r.p.m. continuous. Controls are available for pressures from 250 to 3,000 psi. The speed range is from 450 to 4,500 r.p.m.

The pump has a nonrotatable hydrostatically balanced cylinder block with seven pumping pistons. It weighs 14 lb. and measures 9⅝ in. long. Maximum diameter is 5¼ in. Source: **Weatherhead Co.,** 300 E. 131st, Cleveland 8, Ohio.

●

Plug and probe simplify gaging

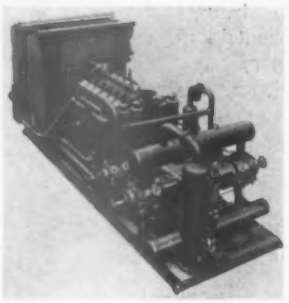
A fast, reliable, accurate way of gaging pressure is offered by this gage plug and probe that have been developed to replace costly fixed gages on wellheads, injection systems, pressure vessels, and piping. The maker claims they are impervious to shock, weather, and most corrosive fluids.

The probe and plug are applicable to high pressure and to vacuum systems for gaging any fluid. For temperatures to 300° F., Viton A seals are used. For higher temperatures, other seals are available. Source: **Taylor Oil Tools,** P. O. Box 4687, Oklahoma City 9, Okla.

Packaged compressor

Where one to four stages of compression are required in handling natural gas, a new packaged field compressor may meet the needs. Built in sizes from 400 to 750 b.hp., the Model CFB-4 unit uses a 5-in. stroke, four-cylinder, balanced-opposed compressor with extraheavy case and running gear to accommodate high loading.

A completely self-contained compressor station, it can be used for gas lift, gas boosting, repressuring, pressure maintenance, field-gas gathering, and air drilling. Operating at 1,000 r.p.m., the compressor is directly connected to an oil-field type of engine by a flexible coupling.



Thirty-six cylinder sizes are available ranging from 21 to 2¼ in. in diameter to cover a pressure range from vacuum to 6,000 psi. Source: **Clark Bros. Co., Div. of Dresser Industries, Inc.,** Olean, N. Y.

Window assembly for process plants

The effects of internal blasts in process plants may be reduced with a new window assembly that has been developed. Called an explosion-venting window, the assembly is fitted with shatterproof polyester panes that react at low pressure levels to vent explosions and so minimize damage to equipment, the building, and its occupants.

In a new plant installation, the window assemblies occupy 80% of the concrete-grillwork exterior wall surface. They consist of a rubber-gasketed 14 by 20-in. polyester panel, bowed outward into a slight parabola and preloaded into a rubber stop to form a tension seal

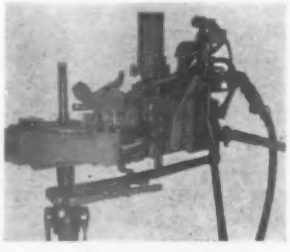
equaling minimum blowing pressure.

If an explosion occurs, the panels push out of the rubber frame to permit the release of gas buildup, without falling from the frame. Immediately following an internal blast, equalizing external pressures reset the panes in the rubber mounting to prevent fresh air from kindling a fire. Source: **Kemlite Corp.,** Republic Ave., Joliet, Ill.

Power tong for sucker rods

Sucker rods can be broken out and made up fast and easily with a new power tong powerful enough to handle 1⅛-in. rods. One noteworthy feature of the tong is its control which is claimed to be accurate enough to avoid overtorquing even the smallest sucker rods.

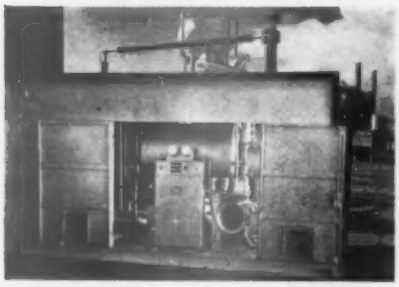
In the high range, the Model 71 tong develops 850 lb.-ft. of torque and turns at 95 r.p.m. In the low range, it develops more than 2,500 lb.-ft. of torque. An adjustable relief valve on the tong permits the operator to set the exact torque desired. Dual controls permit operation of either side. An automatic positioner speeds removal of the



tong from the rod string.

The tong is operated off the same power unit as a tubing tong. Engagement of the tong jaws with the sucker-rod squares is automatic. Release is also automatic by reversing the tong. As separate mechanical torque indicator shows makeup torque accurately. Source: **Foster Cathead Co.,** P. O. Box 1351, Wichita Falls, Tex.

Eliminate Station
Freeze-Up
Cut Construction
COSTS



Specify
TEXSTEAM
unattended
Steam Generators
with Dowtherm®209

Transwestern Pipeline Co. has installed seven Texsteam steam generating units OUTDOORS in areas subject to subfreezing temperatures without fear of compressor station freeze-up.

These unattended Texsteam Coil-N-Shell steam generators will heat the stations and warm engine fuel through the use of a heat-transfer medium . . . Dowtherm®209. Dowtherm forms an azeotropic mixture with water and protects against freezing.

Now, you can install steam generating equipment outdoors in cold areas, eliminate insulation, save construction costs on a utility room. And your Texsteam steam generator is self-contained . . . needs only concrete supports for installation.

If you have a station heating problem, consult Texsteam. For complete information on Texsteam Coil-N-Shell steam generators, write for new sales bulletin.

TXT TEXSTEAM
A SUBSIDIARY OF VAPOR HEATING CORPORATION
Corporation

320 Hughes St. • P. O. Box 9127
Houston 11, Texas • Phone WA 8-5361 6105

Diaphragm-operated dump valve

By merely relocating the body nipple on this Type 70-23 diaphragm - operated dump valve, you can convert it to either a globe or an angle type. No additional parts are required to reverse the actuator. Thus the design versatility of the valve offers a way to minimize valve and parts inventory.

Designed primarily for on-off applications in high-pressure service, the valve comes in 1 and 2-in. sizes with a steel body rated at 4,000 psi. It features a clamp-ring mounting of the actuator to the body. Source: **Black, Sivalls & Bryson, Inc.,** 7500 E. 12th, Kansas City 26, Mo.

•

Barite-recovery machine improved

Three major improvements have been incorporated in the Clayjector barite-recovery machine which result in more stable operation under unattended field operating conditions, greater ease of adjustment, and greater freedom from plugging by drilled solids.

A water-feed pressure regulator holds a uniform pressure on the cyclones. The operator can adjust dilution with one valve when he starts up or makes major changes in operating conditions. A strainer with a cutter blade revolving on it, called an Auto-Screen, has been added to prevent plugging of the unit with solids. Source: **Swaco,** 717 Fort Worth National Bank Bldg., Fort Worth, Tex.

•

Vapor-recovery loading arm

Vapor loss in the loading of volatile fluids can be virtually eliminated with this compact vapor - recovery loading - arm assembly, the maker says. The product is designed for semiautomatic pneumatic operation and features a single-piece assembly arm.

The unit is suitable for truck and tank-car loading of gasoline and highly volatile chemicals. It comes in 3 and 4-in. sizes. Source: **Chiksan Co.,** 332 Pomona Ave., Brea, Calif.

LOWER LIFTING COSTS

In Both Primary and Secondary Recovery, You Can Depend on

THOMPSON ROD PUMPS

Solve down-hole pump problems by standardizing on Thompson Rod Pumps—they run longer, more economically. You can count on reliable performance!

OVERSIZE PUMPS:
1 5/16" Bore for 2" Tubing,
2 1/8" Bore for 2 1/2" Tubing.
STANDARD:
1 1/16" 1 3/4"
1 1/4" 2"
1 1/2" 2 1/2"

Thompson
PUMP COMPANY
DRAWER 591 • OKMULGEE, OKLA.

TRADE LITERATURE

Free mathematical handbook announced

This new 64-page pocket - sized handbook contains formulas and arithmetical rules and should prove to be a handy aid to anyone interested in calculating. The handbook contains powers and roots, logarithms, decimal equivalents, circular-art tables, mensuration formula, weights and measures, and conversion factors. It includes business formulas such as profit and loss, markup, discount, simple and compound - interest tables, along with general arithmetical rules and formulas. Source: **Curta Co.,** 14436 Sherman Way, Van Nuys, Calif.

Trucks for oil-field hauling

Twelve-page Catalog E-122-L lists size and type vehicles to meet various heavy job requirements. Featured are four and six wheelers with diesel, gasoline, or LP gas engines; single and double reduction or two - speed axles; wheelbases for mounting long or short beds, with or without fifth-wheel mountings; conventional or special clutches, transmissions, wheels, and tires. The catalog provides application of equipment such as oil-field bumpers, single or double winches, headache racks, gin poles, and tail rollers. Source: **International Harvester Export Co.,** 180 N. Michigan Ave., Chicago 1, Ill.

Enclosure systems

Now obtainable is this new eight-page brochure entitled "A New Concept in Enclosure Systems Through Functional Design." Included are photographs, cutaway drawings, and feature advantages. Brochure 100 illustrates basic frame structures designed to meet most requirements. Source: **Equipto Electronics Corp.,** 319 N. Webster St., Naperville, Ill.

Facts about plastics

This pocket-sized booklet compares outstanding properties and typical industrial applications of 13 major plastic families in common industrial use. Discussed are acrylic, Implex, nylon, Teflon, polyethylene, flexible and rigid vinyl, cellulose acetate, butyrate, polystyrene, high and medium-impact styrene, phenolic and fibrous - glass - reinforced polyesters, and epoxies. Others are Mylar, ABS, and acetal. The publication corrects five major misconceptions about plastics. Source: **Cadillac Plastic & Chemical Co.,** 15111 Second Ave., Detroit 3, Mich.

Ball-valves literature

Catalog 1200-A provides detailed information on manually and pneumatically operated ball valves ranging in size from ¼ through 12 in. The valves are screwed, socket weld, and flanged-end models for temperatures from —150° to 1,000 ° F., and pressures to 1,000 psi. Two basic types of valves catalogd are: the McCannaseal, a top-entry valve which permits maintenance without removing the body from the line; and the McCannaflo, a valve with one-piece bar stock body and end adapters. The 32-page catalog provides dimensions, weights, material specifications, pressure-temperature rating charts, and a page of ordering instructions. Source: **Hills-McCanna Co.,** 400 Maple Ave., Carpentersville, Ill.

Newest air clutch

Bulletin 57A, now available, illustrates and describes advantages of the Power Flo clutch, said to provide a high-torque capacity for its size. The four-page literature piece offers engineering specification tables showing clutch size, torque, horsepower, and revolutions per minute. Another chart gives capacities of various-sized clutches. Source: **Mid - States Industrial Clutch Co.,** Box 848, Wichita, Kans.

Screen-pipe literature piece

Complete with illustrations, this eight-page bulletin deals with various types of screen pipe. It lists all gages, spacing, and specifications for tubing, line pipe, and casing, with various methods of slotting or drilling, based on specific requirements. Source: **Emsco Screen Pipe Co. of Texas, Inc.,** Box 14446, Houston 21, Tex.

Industrial-pumps repair manuals

Eight - page manuals outlining head repair instructions for end-mounted sealed and packed industrial pumps have been made available for distribution. Manuals M 101-4 and M 101-5 specify tools to be used, while offering complete disassembly and reassembly instructions, cleaning and inspection hints, and general information. Each step in the process of repair is specifically stated. Additional help is provided by the use of a line drawing, exploded view of pump head, and photo of cutaway pump. Source: **Turbine Pump Div., Roy E. Roth Co.,** Rock Island, Ill.

Motors, adjustable-speed drives

Available free to interested persons is this application bulletin on motors and drives used in chemical-processing industries. The literature features application photographs of gearmotors, adjustable-speed drives, and explosionproof, nonventilated, dripproof, and wound-rotor motors. Descriptive data is included on all equipment listed. Source: **Louis Allis Co.,** 427 E. Stewart, Milwaukee, Wis.

Trailer-mounted drilling mast

Just published is Bulletin F-328R, introducing the T-97 trailer-mounted drilling mast. In six pages it gives detailed drawings of basic steps in erecting the mast. Complete specifications are included. Source: **Continental-Emsco Co.,** 608 Continental Bldg., Dallas 1, Tex.

Delrin acetal-resin pipe

This booklet gives case-history information on 31 typical early installations of oil-field pipe made from Delrin acetal resin. The histories cover applications by both large and small producers in nine states. Included are flow lines, gathering lines, water-flood lines, and salt - water - disposal lines. Source: **E. I. du Pont de Nemours & Co.,** 1007 Market St., Wilmington 98, Del.

EQUIPMENT MEN

LeRoy J. Stoutenburg becomes sales manager of Kline Mfg. Co.

Stoutenburg was formerly sales manager of the Hydraulics Division of American Engineering Co., Philadelphia. Previous to that he was with Rivett Lathe & Grinder, Inc. Since 1931 Kline has manufactured aircraft and industrial hydraulic components. Recently the Galena, Ohio, firm began marketing a new line of axial-piston high-pressure 5,000-psi. pumps and motors in capacities up to 475 hp. for oil-field-tool operations. Kline was purchased last May by Cooper-Bessemer Corp.

GUESTS ATTENDING the recent meeting of the Houston Chapter of Nomads were, top row, from left: Joe Davis, Rice University line coach; Bill Whitmore, Rice University publicity director; and H. A. Opbroek, Asiatic Petroleum Corp., Houston. In the bottom row, from left, are: Mario Cueto, Reed Roller Bit, New York City; G. M. L. Franco, Petrobras, Salvador, Bahia, Brazil; T. Kinoshita, Japan Petroleum Exploration Co., Tokyo; and J. L. Hammer, Mene Grande Oil Co., Maracaibo, Venezuela.

W. C. Norris Division of Dover promotes Paul W. Colvard

Assigned to the company's West Texas sales division at Odessa where he had been serving as a division sales representative, Colvard assumes the new title of assistant division manager. In this capacity he will continue to be stationed in Odessa and will be responsible for sales activities in West Texas and New Mexico. The West Texas sales division functions under the direction of W. J. Whitaker, division manager.

Colvard has been with W. C. Norris since 1947. During this time he held positions in the company's main office in Tulsa and division offices in Houston and Odessa.

COMMON STOCK of Baker Oil Tools, Inc., Commerce, Calif., was listed on the New York Stock Exchange earlier this month under the symbol "BKO." The first 100 shares were traded at 10. Baker manufactures more than 250 separate products used in oil and gas-well drilling, cementing, and similar-type construction. Present for the listing were (from left): Theodore Sutter, president of Baker Oil Tools; Phillip L. West, vice president and director of the stock list department of the exchange; and Roy M. Madison, of Homans & Co., specialists in the stock.

A. S. Clarke named to manage eastern div. of Ralph N. Brodie

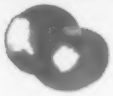
A. S. Clarke

With headquarters in Mount Vernon, N. Y., Clarke will be responsible for sales and service of Brodie meters and control valves throughout the eastern and southern seaboard market areas.

The California-based meter and valve manufacturer also announced the transfer of Don Kingsley to the

Brass Tacks

FROM HALLIBURTON



Wide Range of Halliburton Fracturing Treatments Succeed Where Others Fail

Vis-O-Frac Yields 500% Increase Where Nothing Else Succeeded

Allen Parish, La. — Other types of fracturing jobs had been tried in this area — with no appreciable results due to sand-outs. Then Vis-O-Frac treatment was performed for a major operator and yielded a 500% increase in production from 180,000 cu. ft. per day with 125 psi surface pressure to 880,000 cu. ft. per day with 1,550 psi surface pressure. This old well produces from Oberlin sands at 9,226 to 9,240 ft. What made the difference? First, a pre-treatment was run consisting of 15 gal. of Hyflo surfactant mixed with 15 bbl. of oil. This helped lower breakdown pressure and remove any emulsions that may have existed. Then Vis-O-Frac treatment with FL-2 fluid loss additive was run — consisting of 13,000 gal. gelled oil with 10,900 lb. of 20-40 sand tailed-in with 600 lb. of 8-12 sand. Two HT-400 fracturing trucks delivering up to 1,100 hydraulic hp pumped the treating fluid at a rate of 7.5 to 8 bbl. per minute down 2″ EUE tubing. Injection pressure of 6,000 psi dropped to 5,200 psi after the Vis-O-Frac fluid, a true gel, began lowering the friction loss in the treatment.

Waterfrac/Frac-Shot Stops Sand Where Other Attempts Failed

Lincoln County, Oklahoma — Sand returning to the well bore cut out surface fittings on wells in the same zone of a field. Halliburton recommended a Waterfrac treatment tailing in with aluminum pellets, Frac-Shot, thus eliminating the sand problem on this new well. Treatment on the Red Fork gas sand between 3,362 and 3,372 ft. consisted of injecting 20,000 gal. of gelled salt water with 12,000 lb. of 20-40 sand, tailed-in with 1,300 lb. of 10-20 sub-round sand followed by 350 lb. of 8-12 aluminum pellets. Several other wells were fractured using this Waterfrac/Frac-Shot treatment — also with no damaging sand returns. A Twin T-10 and three HT-400 fracturing trucks using an M-45 proportioner injected the treatment.

FRACPLAN Opens Duster For 2,500,000 CFD Gas

Walthall, Mississippi — Logs on a recently completed well showed three dubious production zones in the Good Friday sand of the Lower Tuscaloosa formation near 9,600 ft. Gas would not flare on an initial test and the operator submitted cores for a Halliburton FRACPLAN recommendation. A Waterfrac treatment was performed on the three potential producing sections — two sections three ft. thick and another four ft. section. Treatment consisted of 30,246 gal. of gelled water in three 10,083 gal. stages with Perfpac balls to divert and separate the stages. Propping agent used in each stage was 3,420 lb. of 20-40 sand tailed-in with 615 lb. of aluminum pellets. *Production resulting from this Waterfrac:* 2,500,000 cfd at 2,100 psi with 7 bbl. of condensate per MMCF. Another Waterfrac job using this same FRACPLAN on an offset well gave approximately the same results while similar treatments without the benefit of FRACPLAN on two other offset wells only yielded increases of 750,000 to 1,000,000 cfd.

Multifrac Doubles Oil Yield Over Other Wells

Sweetwater County, Wyoming — A major independent operator owned four wells in the center of a field that all produced about 100% higher than the wells around them after fracturing. The difference — a Vis-O-Frac treatment with higher than usual sand concentration in four stages separated by Perfpac balls was performed on each well. This boosted total production to 3,100 bpd and after four months was still up to 2,500 bpd. These new wells are in Almond Sand of the Mesa Verde formation at 4,645 to 4,681 ft. Vis-O-Frac treatment consisted of 38,000 gal. of gelled diesel oil with 1/20 lb. per gal. of FL-2 low fluid loss additive and 55,000 lb. of 20-40 sand. Three HT-400 pump trucks with an M-45 Proportioner and ball injector performed the treatment.

HALLIBURTON OFFERS A WIDE RANGE of fracturing treatments for you to select the best combination of fluids and propping agents to exactly meet your well's requirements. Call your Halliburton Representative today.

First and Foremost in Formation Fracturing

FRACTURING SERVICES

Halliburton
COMPANY • DUNCAN, OKLAHOMA

post of special representative to major oil concerns. Headquarters for this new post will be in Brodie's New York City sales office.

Wendell Lloyd named exec. v.p. of Drilling & Service, Inc.

W. E. Lloyd

Harold E. Robison, president of Wheel Trueing Tool Co., Detroit, has announced the appointment of Wendell E. Lloyd as executive vice president of the newly acquired subsidiary, Drilling & Service, Inc., of Dallas. Formerly treasurer of Wheel Trueing Tool, Lloyd assumes his new responsibilities at the subsidiary's Dallas headquarters. Drilling & Service combines the manufacture, sales, and service of oil-field diamond-drilling equipment for the parent firm.

Geolograph Oil Field Services names Ross general sales mgr.

Edward L. Ross joined Geolograph in 1949 as a field representative and later was appointed manager of district offices in Grand Junction and Sterling, Colo. He will direct sales activities from the company's headquarters in Oklahoma City.

Stupp Corp. elects H. E. Midkiff vice president in charge of sales

H. E. Midkiff

The announcement comes from Kenneth S. Bayless, executive vice president of the firm. For the past year, Midkiff has been the company's sales manager. He moved to Baton Rouge from Tulsa to fill the vacancy created when Bayless was elected executive vice president last year. Previously Midkiff saw service with the company in Tulsa as area sales manager.

Williams is named v.p., sales by Youngstown Sheet & Tube

R. E. Williams

Robert E. Williams has become vice president—sales of Youngstown Sheet & Tube Co., succeeding Myron H. Watkins, who resigned October 1 after 36 years with the company. Watkins had been vice president—sales since 1954 and a director of the company since April 1960.

Williams previously was vice president—sales of National Tube Division of U. S. Steel Corp. He began his career in the sales department of U. S. Steel's Columbia-Geneva Steel Division in 1935.

Robert C. Hensley joins Grove Valve & Regulator as sales engr.

The announcement was made by George E. Doty, Grove's vice president and general sales manager.

"Triple Threat"
TO SUCKER ROD FATIGUE
1. JONES SUCKER RODS
2. JONES UNDERCUT PINS
3. JONES ROLLED THREADS
1
Rolled threads are stronger at the point where most pin failures originate . . . steel fibers and grain are rearranged to follow the thread contour, providing a dense structure at the critical thread root. Sucker rods with rolled threads make up tighter and stay tight because there are no high spots to beat down and cause the joint to loosen.
Undercutting the pin shank further increases fatigue resistance by eliminating the run-out thread and improving the elasticity of the joint.
Ask your Jones representative for further information on the "Triple Threat".
THE S. M. JONES COMPANY
Division of Buffalo Eclipse Corporation
General Office and Factory: TOLEDO, OHIO
Sales Office: Enterprise Building, TULSA, OKLAHOMA
Export Department: The S. M. Jones Company
2
3
JONES
SUCKER RODS

Hensley, with more than 7 years of selling and technical-service experience in the oil industry, will locate in Grove's sales office in Odessa.

Robert S. Page joins Power Piping Div. of M. W. Kellogg

He will serve as an engineering sales representative assigned to Kellogg's New York sales office. Page was previously with C. F. Braun & Co., Alhambra, Calif., and Alco Products, Inc., Schenectady, N. Y., as New York sales representative.

Glenn S. Ramsay to represent Moran Furnace & Sheel Metal

G. S. Ramsey

According to W. O. (Bill) Moran, owner of the Tulsa-based firm, Ramsey will concentrate his attention on the promotion of Moran positive - draft - control systems for industrial heaters. These systems are used in the petroleum industry throughout the U. S. and Canada. Ramsey previously worked for Patterson Steel Co. in Tulsa for more than 8 years as an industrial fabrication salesman.

James E. Ware takes over as sales manager for Hoke, Inc.

J. E. Ware

Ware joined the Cresskill, N. J., manufacturer of special - purpose fluid - control products following 13 years as resident sales engineer for Chicago Pneumatic Tool Co. He replaces Ray Moody at Hoke. Ware will direct the company's distributor and field-sales network for the entire country. As a member of the marketing department, he will also be responsible for sales forecasting and sales training.

H. Dickinson assumes title of Dynel, Inc. general manager

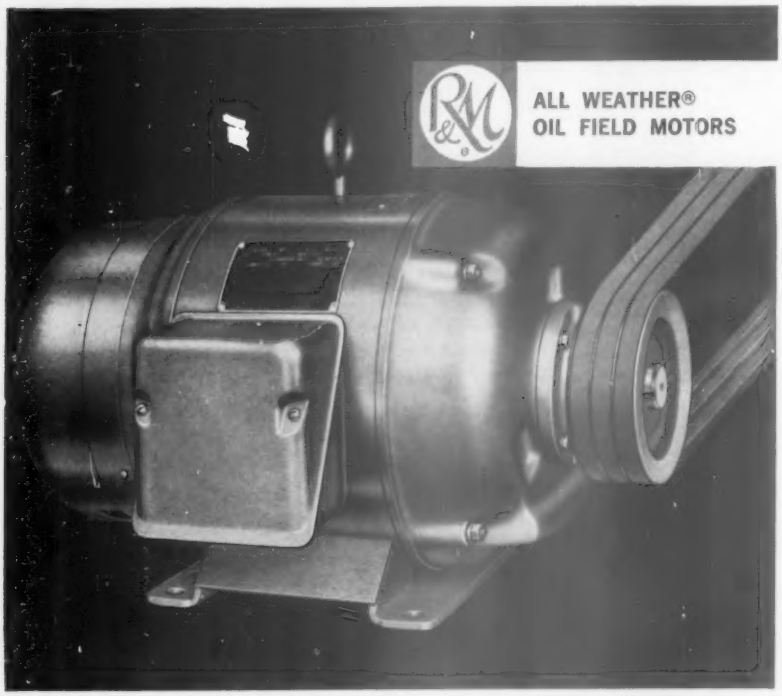
H. Dickinson

The announcement was made by Ray V. Long, president of Varec, Inc., parent organization of Dynel. Located in Los Angeles, Dynel manufactures electronic gages and pulse - code systems for telemetering and control application in the process industries.

Dickinson joined Varec's engineering department in 1951, becoming chief electronic engineer in 1952 with responsibility for all electromechanical activities. In 1959 he was appointed vice president of engineering, and became a member of the board of directors in 1960. Dickinson continues in his corporate position as vice president of Varec, Inc.

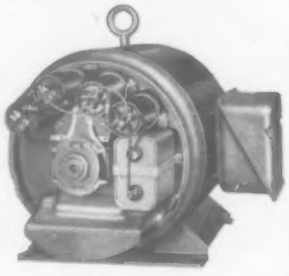
B. J. Ramey rejoins Tube-Kote as general marketing manager

Ramey will be responsible for the company's marketing programs, related to growth and diversification in the field of corrosion control. He formerly served in the New York office of Western Geophysical Co.



R&M "ALL WEATHER®" SINGLE PHASE MOTORS . . . RATINGS THROUGH 20 HP

R&M Single Phase Motors are fully weatherized *at no extra cost* . . . can be installed outdoors without cover, and in damp, dusty or corrosive atmospheres. Auxiliary mechanism (at right) is externally mounted (frames 254U and up) beneath weatherproof cover for simple inspection, even while motor is running. Available in Open-Protected frames through 20 HP; Totally-Enclosed Fan-Cooled or Explosion-Proof types through 5 HP. Write today for R&M Bulletin 470-B-OG



ROBBINS & MYERS, INC., Springfield, Ohio

Fractional and Integral HP Electric Motors • Electric Hoists and Overhead Traveling Cranes • Moyno® Industrial Pumps Propellair® Industrial Fans • R & M-Hunter Fans and Electric Heat • Trade-Wind Range Hoods and Ventilators

Subsidiary companies at: Memphis, Tenn., Pico Rivera, Calif., Brantford, Ontario.

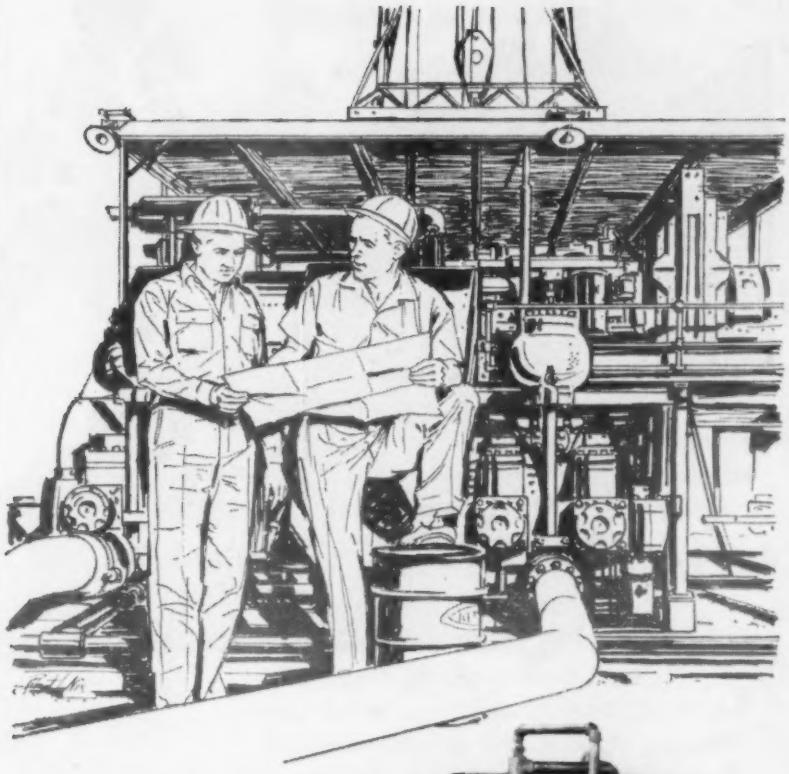
QuiK-Konnect
PLUGS AND JACKS

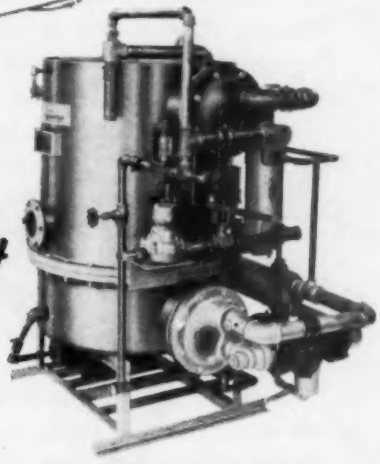
New Honeywell QuiK-Konnect Plug and Jack Assemblies provide fast, foolproof connection of thermocouples to extension wire, and thermocouple extension wire to instruments. Inserts of different diameter positive and negative poles insure correct polarity every time. Inserts are easily removed for field calibration change or replacement, and can be furnished in different metals to match thermocouple alloy. Honeywell Quik-Konnect Accessories include identos, cable clamps, and tube adapters.

Get complete details from your nearby Honeywell field engineer, or write today for Specification Sheet FS 005-3. Minneapolis-Honeywell, Wayne and Windrim Avenues, Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell

First in Control





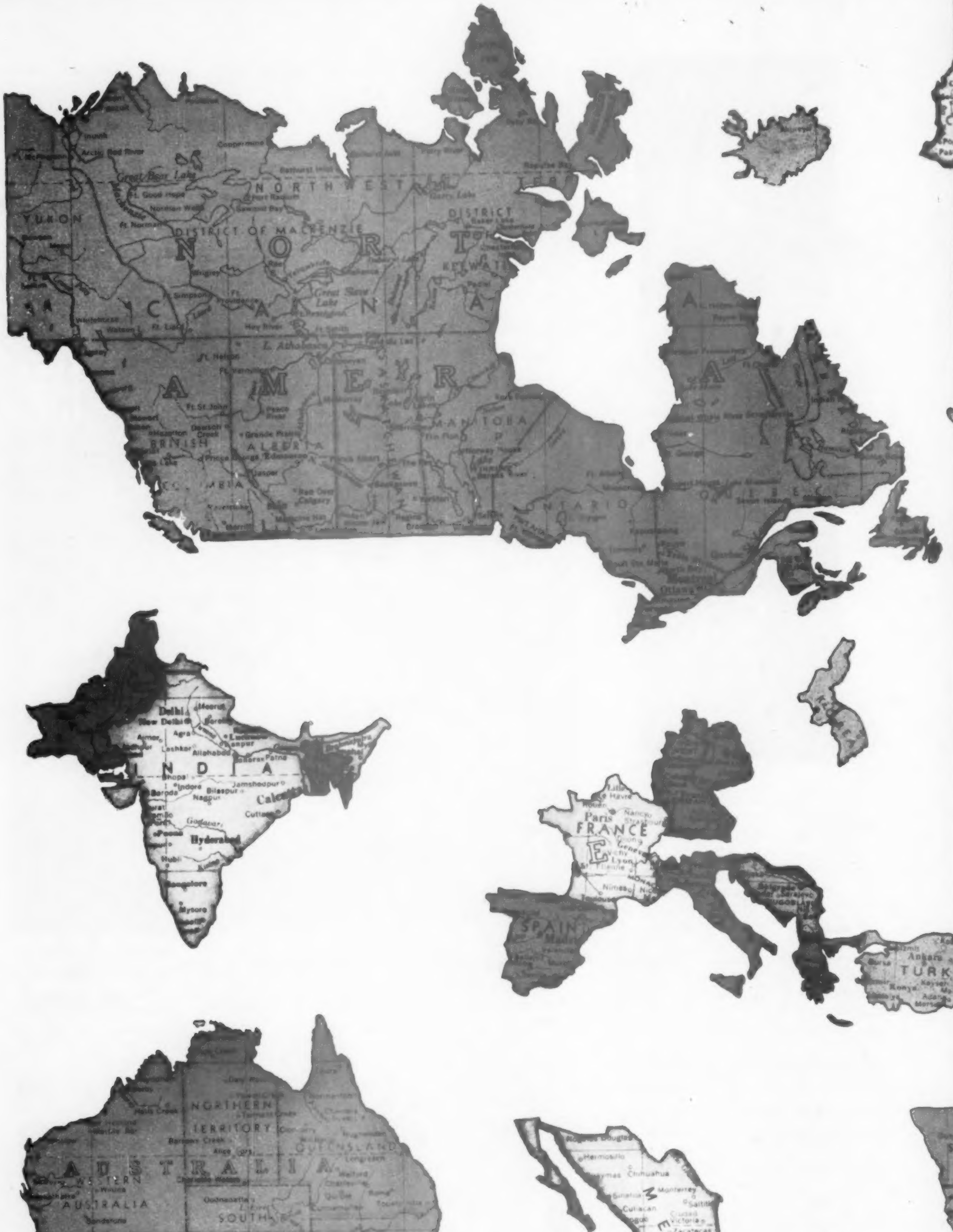
And you can't get far without Fresh Water

That's why more and more producers are making their own fresh water on the spot with the new compact Aquavap evaporator. All you need is a good supply of water, salt or brackish, and an engine to tap for jacket water which acts as the heat source for the evaporator. That's all the heat you need. Inexpensive, simple to install, easy to operate, Aquavap produces water of a purity exceeding U.S. Public Health Service requirements. It is delivered as a packaged unit ready to install. Capacities range from 150 to 12,500 gallons per day of fresh water.

For further details write Dept. O for this new Aquavap Bulletin.

American Machine & Foundry Company
MAXIM EVAPORATOR DIVISION
WATERFORD, CONN. • Branch, DENVER, COLO.

Represented by **THE J. B. BEAIRD COMPANY,** Shreveport, New Orleans, Tulsa, Midland, Houston, New York



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DISTRICT OF MACKENZIE
DISTRICT
KEEWATIN
N O R T H
A M E R I C A
Great Bear Lake
Great Slave Lake
L. Athabasca
MANITOBA
ALBERTA
BRITISH COLUMBIA
ONTARIO
Grande Prairie
Edmonton
Calgary
Ottawa
Montreal
Delhi
New Delhi
Agra
Allahabad
Patna
I N D I A
Bhopal
Indore
Baroda
Jamshedpur
Bilaspur
Nagpur
Calcutta
Cuttack
Godavari
Poona
Hyderabad
Bangalore
Mysore
KOREA
Lille
Le Havre
Paris
Nancy
Strasbourg
FRANCE
Dijon
Geneva
Lyon
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Douglas
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Chihuahua
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Chemico process plants are operating profitably all over the map

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READY TO WORK after building is finished, this platform will be operated by Shell Oil Co. to drill development wells (photos courtesy of Shell).

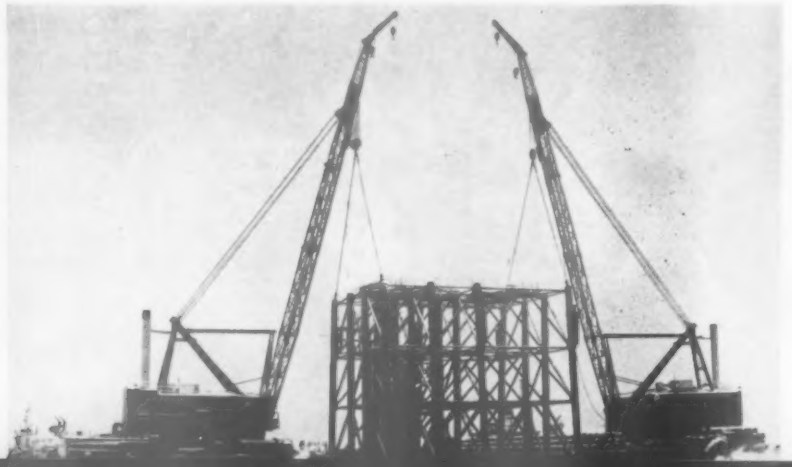
Shell's new giant platform goes to work in Gulf of Mexico

ONE OF THE LARGEST loads ever lifted in offshore Gulf of Mexico waters was done by J. Ray McDermott & Co. for a production development platform to be operated by Shell Oil Co. at West Delta Block 32 field in Louisiana.

It took two 250-ton crane barges to lift the 450-ton foundation jacket which was set in 60 ft. of water. On this foundation, three deck sections for housing, drilling, and production were set.

Shell will use this platform to drill 12 development wells. Although a large structure—it will be used for

BIG LIFT of Gulf of Mexico platform requires two crane barges to set 450-ton foundation jacket in 60 ft. of water offshore from Louisiana.



both drilling and production—no oil will be stored upon it. To eliminate a fire hazard, the crude will be processed as it comes up and the products will go into flow lines directly to onshore facilities.

The platform was built at McDermott's Bayou Boeuf yard and barged to the present site where it was assembled. It measures 199 ft. by 82 ft. and stands on 28 piles which are 125 ft. tall.

Mexican offshore campaign slated

DRILLING for oil in the Gulf of Campeche in Mexican offshore waters was begun this month by Offshore Co. of Baton Rouge. Location is on a concession about 800 miles due south of Louisiana. It is Offshore Co.'s first contract to drill in Mexican waters.

The contract drilling company announced here that the self-contained unitized platform was loaded aboard a barge at Bayou Boeuf, La., and towed to Santa Ana field off the coast of the Mexican State of Tabasco.

On location, Rig 24 was mounted on a new, permanent structure that will enable it to drill 16 wells without being moved. Quarters on the platform can accommodate 42 men. About 10 Offshore Co. personnel accompanied Rig 24 to Mexico, to work in mostly supervisory capacities. Other labor will be drawn from local sources.

The eastern Mexico offshore region has been described as the largest unexplored expanse of reasonably shallow waters remaining in the Gulf of Mexico.

Many oil men consider its potential highly promising. There is already onshore production in a half dozen areas from the Rio Grande to the Yucatan Peninsula, with most of the coastal territory in between on the probable list of Mexican Government geologists. But the Santa Ana field, discovered by Pauley Pan American in 1959, is the only producing Mexican offshore field.

Rig 24 has a National 130-E draw works, two Emsco D-850 and one Emsco D-300 pumps, and is powered by two Alco 251-B diesel engines, each driving two General Electric GT 592 generators. It has a 136-ft. Lee C. Moore derrick.

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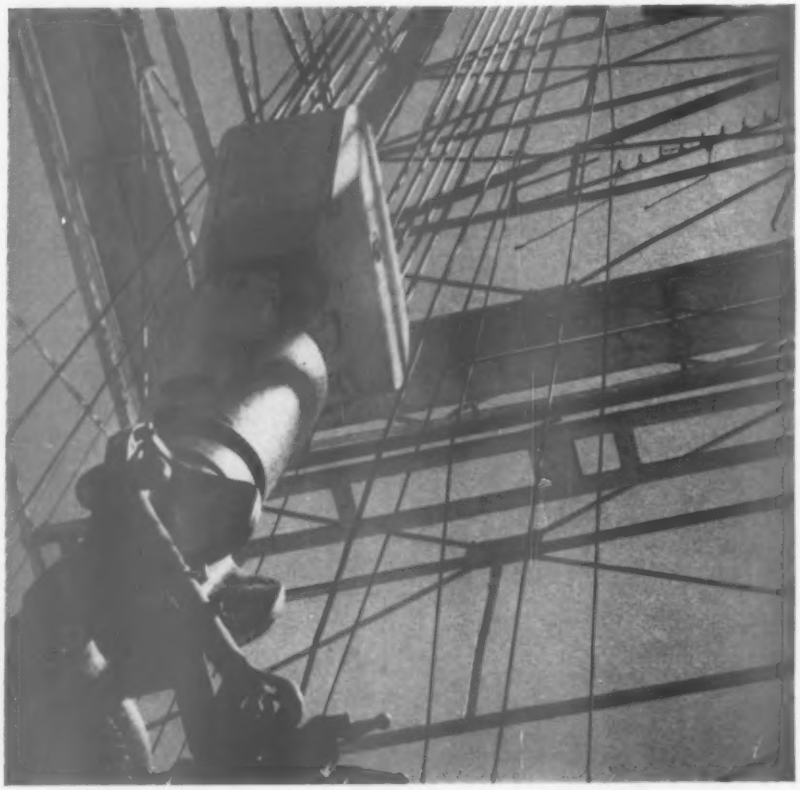

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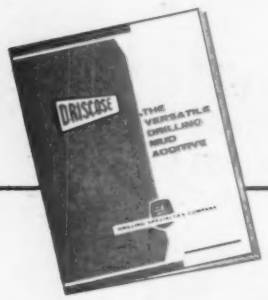

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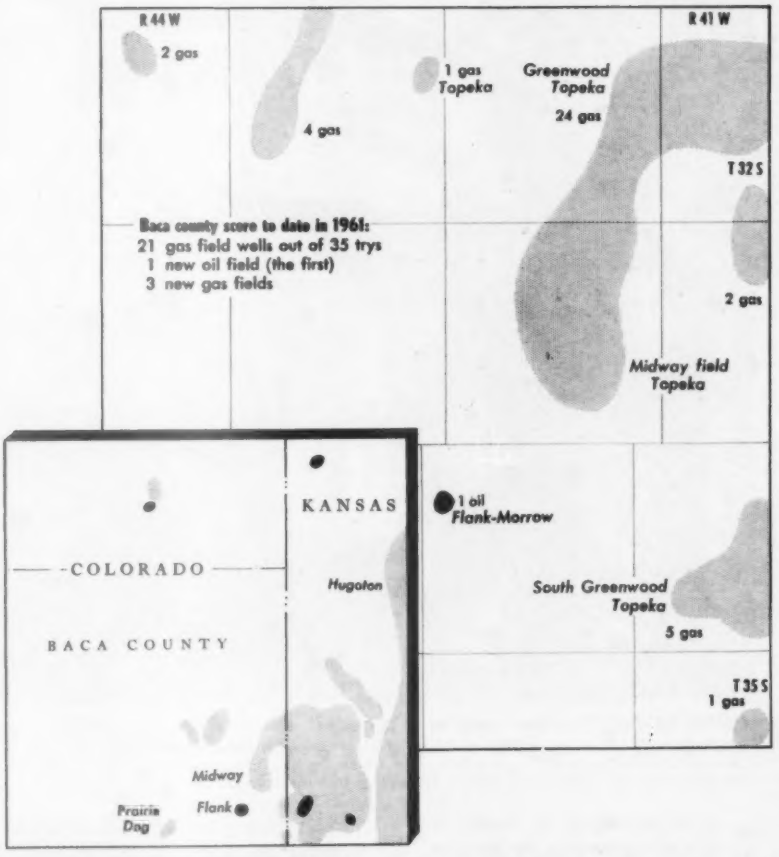


ALL SIGNS POINT to this being Southeast Colorado's biggest drilling year yet. A small number of operators have been doing the drilling, while those with large holdings have yet to enter the play.

Noise suddenly erupts from quiet Anadarko basin corner

BY JOHN C. McCASLIN

A RATHER QUIET corner of the northwestern Anadarko basin has suddenly jumped into exploratory news. Information has just been released on 25 wells in Baca County, southeastern Colorado. Of this total 14 are new oil and gas producers (see Page 208 for well data).

Tight holes. Until mid-October information on this tight corner of Colorado has been scanty. Horizon Oil & Gas Co. reports success at 14 wells in a 20-township area south of the Las Animas arch in 31-35s and 41-44w near the Kansas border. There are two new field discoveries in this tally. Flank field was opened in 7-34s-42w, Baca County, and new gas production was tapped at a wildcat in 12-32s-43w. Horizon 1 Tevebaugh, C NW SE 7-34s-42w, Baca County, pumped 106 bbl. of oil daily from Morrow Pennsylvanian. This is the first oil producer in the area. It is also practically a new pay for the county since only three wells have Morrow production in this Topeka area.

The new gas-pool opener is Horizon 1-12 Trahern in C NW SE 12-32s-43w. This well flowed 2,600 M.c.f.d. from Topeka Pennsylvanian.

Midway leads. Midway field is rapidly becoming a large gas-producing area just west of the near-giant Greenwood gas field.

Midway field is 6 miles north-south and 3 miles wide in 32, and 33s-42w. Spacing here is 640 acres. There are 24 Topeka gas wells in the Midway and Colorado Greenwood gas-field area. Current drilling indicates no end to the north or south sides of the field.

This Midway area was opened in 1958 at Amerada Petroleum Corp.'s 1 Pride unit in NW SE 23-33s-42w. The well made 1,426 M.c.f.d. from Topeka. Last year, the field officially became Midway at Horizon 1-22 Cogburn in C NW NW 22-33s-42w. This well made 8,450 M.c.f.d. from dual zones in Topeka and Morrow. All of the other wells in the field are Topeka producers, the big pay for this section of the Anadarko basin. There is some Lansing-Kansas City production at Prairie Dog field in southern Baca County. Most of the wells in Baca County have gone to Mississippian, but no production has been established here as yet.

Old, but slow. Development of southeastern Colorado's oil and gas potential has been long and slow. The discovery well for this section of the state and of the northwestern corner of the Anadarko basin was Continental Oil Co. 1 McClave, 20 miles northwest of Lamar in Kiowa County in 1952. That well flowed 357 M.c.f.d. from Morrow sand, opening the McClave gas area. The field was abandoned, reopened, and grew into the largest producing area in the region until Midway and West Greenwood came into being. Later, other fields were tapped in Kiowa and Bent counties.

Plans calls for additional field wells and wildcats in southeastern Colorado's corner. Future work in this part of the Anadarko basin might well turn up several large Greenwood-type fields, filling in one of the basin's long underestimated areas.

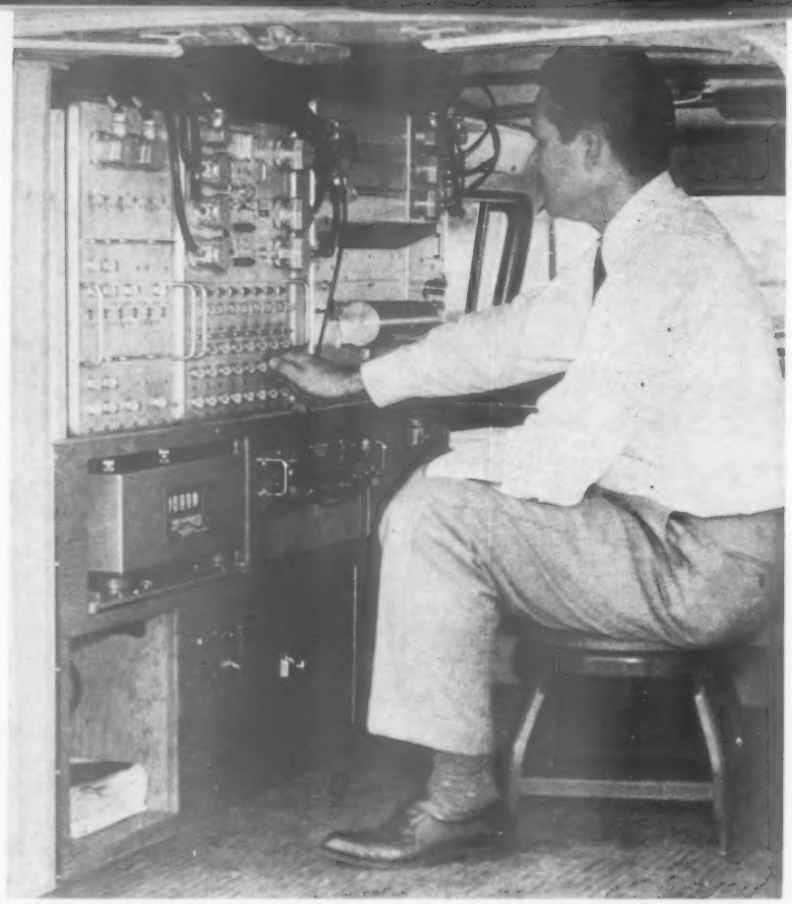
VELA seismic equipment opens new oil-hunting horizons

EARLY THIS YEAR final field acceptance tests were completed by the USGS on a new very-low-frequency recording system. This same equipment should have great interest to oil-exploration seismologists. Designed and built by the SIE Division of Dresser Electronics in Houston, several of these systems are now in use as part of the VELA UNIFORM program. Seismic amplifiers with greatly extended low-frequency response and dynamic range are employed. At the same time high sensitivity and low-internal noise characteristics have been provided. The low-noise characteristics open up new dimensions for refraction work both with and without tape recording.

VELA UNIFORM is a program under the auspices of the Defense Department's Advanced Research Projects Agency (ARPA). The program is involved with improvements in seismological and other geophysical techniques for detecting underground nuclear tests and distinguishing them from earthquakes and other natural seismic disturbances. The first research work being done by the Geological Survey group is concerned with determining velocities, travel times, and seismic-wave propagation paths typical of those for testing underground nuclear blasts.

Similarly between the USGS work and oil-exploration refraction surveys is obvious. However, the equipment supplied to the USGS offers significant potential improvements over present refraction instrumentation techniques in oil exploration.

Technological advances. Signals to be detected in the USGS crustal-study program are usually of much smaller amplitude and lower frequency than conventional oil-refraction survey signals, primarily because of the greater distances involved—sometimes almost 300 miles. However under some conditions signal amplitudes may be much larger than usual. These problems dictated improved equipment design, since no conventional seismic instrumentation available was deemed satisfactory. Amplifiers provided in the new system have a broad-band frequency response extending down to 1 c.p.s. with distortion less than 0.5%. Peak-to-peak noise in the amplifier is limited to approximately 0.12 mv. in the pass band of 1 to 26 c.p.s. Power consumption is an important consideration; however, use of transistors throughout allows power specifications to be met easily. The eight-channel amplifier systems now in use consumes less than 1 amp. of 24-volt. d.c. power.



SEISMIC INSTRUMENTS are used to check very weak energy encountered in long-range refraction work. Equipment is solid state with frequency range of 1 to 200 c.p.s. and sensitivity of 1 μv. r.m.s. The noise level is approximately 0.05 μv. r.m.s. The author, L. R. DeBell, is shown checking the instruments.

BY LAWRENCE R. DeBELL
Dresser Electronics, SIE Division,
Houston

Improved results. The first field tests were extremely encouraging. Briefly these tests indicated that: (a) smaller than normal charges may be used, (b) longer distances than heretofore possible with conventional seismic equipment may be covered resulting in deeper information, and (c) significant improvements in record quality may be obtained by using magnetic tape recording.

Full details of some of these tests will be made public by the USGS later this year.

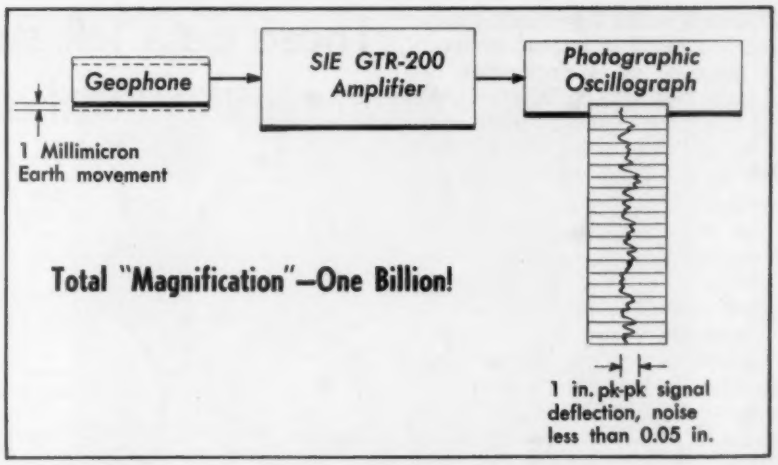
Tape playback for dollar savings. The initial field tests clearly showed the inherent advantages of using tape recording in conjunction with selective filtering. The original recording may not be adequate for proper determination of the very weak first-arrival energy. Also, in many cases, it is difficult to predict optimum recording bandwidth and sensitivity. A magnetic medium therefore provides a distinct economic advantage in exploration work. Optimum filter-band width may be selected during subsequent playbacks to improve the signal-to-noise ratio. Very weak data otherwise obscured is then recovered. Repetitive field shooting can be totally eliminated. Field playback

allows immediate evaluation of the recorded data while the crew is still on location.

Low instrument noise. There are advantages of using magnetic recording in long-range work; however, performance of the new amplifier system is such that magnetic recording is not always required. The inherent low noise of the system allows recording very weak signals in the presence of relatively strong undesirable energy. Therefore satisfactory recordings can be made if the useful signal frequency is approximated and optimum filter band width selected in advance. For example, it would not be unusual to encounter normal ground unrest noise levels in the order of 10 mv. under wide-band conditions; however, a narrow-band filter may be selected to yield useful energy of levels as low as 1 mv. Under these circumstances the signal is still at least 20 db. above the instrument noise—a necessary requisite to establish confidence in the data.

Two-level recording. Four outputs are provided from the new amplifier: one pair for dual-oscillographic recording and one pair for tape recording. The latter allows two different modulation levels. By this means the effective dynamic range of tape equipment is greatly extended.

Approximately 50 db. of dynamic range is the maximum practical for modern equipment for one channel. This represents the range from basic noise to 100% modulation. To recover a usable signal from the tape it is necessary that the signal be about 20 db. above the noise. This means that there is left only about 30 db. of useful dynamic range.



BLOCK DIAGRAM shows "movement magnification" for typical long-range refraction or horizontal survey setup using VELA UNIFORM equipment.

Furthermore, the ratio of useful refraction signals to the wide-band seismic energy recorded may quite easily approach 20 db.; therefore the remaining margin for error in dynamic range is only 10 db. The usual field variables of surface conditions, charge size, distance, earth density, and other considerations may easily produce more than 10 db. of "unknown variation". It is therefore obvious that a wider dynamic range would be valuable—and in many cases vital.

This added range may be obtained by recording at least two levels of modulation approximately 30 db. apart. By this method a 40-db. margin is produced instead of only 10 db. Twice as many tape channels are required to accomplish such a range; however, in most cases the advantages far offset the slight extra cost for the additional channels.

Equipment in use. The integrated systems used by the USGS are composed of an eight-channel SIE GTR-200 system with an SIE 10-in., 19-trace TRO-10A oscillograph; a 14-channel SIE MR-200 FM magnetic record/reproduce system; a Specific Products WWV receiver Model WVTR; and a Westrex Model TS-3 Times chronometer. In addition, the USGS incorporated a Karr Model 222 radio transceiver. The geophones used are the 2-c.p.s. Hall-Sears Model HS-10. This equipment fits very nicely into a small panel truck.

The USGS system is arranged to provide recording of 6 vertical information channels and two auxiliary channels for special lower-period vertical or horizontal elements. The oscillograph record displays these eight channels with two levels of amplitude, one level approximately 15 db. lower than the other. A 100-c.p.s. fork trace is also displayed, as well as shot-time information and the chronometer timing pulses, making a total of 19 traces on the monitor oscillographic record.

The 14-channel tape system records the six vertical-information channels with two levels of modulation. There is approximately 30 db. difference between these levels to allow the most efficient use of the tape system. The 100-c.p.s. signal is recorded on the thirteenth channel. The fourteenth channel accommodates the shot-time information and the chronometer pulses. The tape may be played back through the filters to the oscillograph, and either of the modulation levels may be selected for this process. Timing information also appears on the playback record.

PANEL TRUCK is all that is necessary as a field unit for Major Crustal Studies project of VELA UNIFORM program for Department of Interior. The unit contains the low-frequency seismic refraction recording equipment.

What it means for oil exploration. The full range of improvements to be achieved in oil-exploration refraction and deep-refraction shooting is not now known. More complete results from the USGS work will be published as they become available. However, even at this stage of development some of the potential economic advantages made possible by improved instrumentation are made manifest.

Increased sensitivity in the low-frequency range provides obvious increases in long-range seismic surveys—surveys vital to early exploration of the world's sedimentary basins yet to be searched or now in early phases of exploitation. Deeper drilling in older areas has recently revealed major unconformities. These potential oil traps were not mapped by earlier surveys because of limited energy penetration and recovery. If "subsubsurface" information can be obtained, geological interpretation is made significantly more easy and meaningful. Furthermore, if basic geological activities can be determined, detailed shallow surveys in the normal oil-producing horizons can be carried out with more accuracy and confidence.

By using the new amplifier in conjunction with tape recording, longer distances may be covered and smaller charges used. Additional information can be recovered from records taken. With the renewed interest and activity in refraction and deep-reflection shooting apparent in the geophysical industry, oil seismologists may find instrumentation progress in this field of great value.

Two wildcats slated for Alaska's Kenai

PAN AMERICAN Petroleum Corp. has staked locations for two wildcats across Cook inlet from the Kenai Peninsula.

One will be drilled 30 miles west of Swanson River field in the northeast quarter of the southeast quarter of Sec. 21-8n-14w. Coastal Drilling Co. has the contract. The other is in SE SW 30-12n-12w. Both tests are on acreage held with Skelly, Sinclair, and Phillips.

Pan American recently abandoned a wildcat at 14,910 ft.

These data tell story of recent activity in Southeast Colorado

1. Barrel Springs Morrow oil field, Prowers County, Skelly Oil Co. 1 Bailey, C NE NE 3-26s-45w. IPP 72 BOPD, 5,027-36 ft. Net pay thickness 9 ft. Deepest test Mississippian. Location 20 miles southeast of Lamar. Well was first oil producer in county. Discovery date, 1959.

2. Barrel Springs Morrow gas, Prowers County. 19 miles southeast of Lamar. Excelsior Oil Co. 1 Bailey, C NE SW 27-25s-45w. Completed 1958. IPF 3,300 M.c.f.d., 4,912-22 ft. Net pay thickness 10 ft. Deepest formation tested Mississippian. First gas producer for county.

3. Bent's Fort Atoka oil field, Bent County, 12 miles northeast of Las Animas. M. J. Stansbury 1 Cordes-Oberlander, SW SW 21-21s-51w, completed 1955. IPF 28 BOPD, 1,200 M.c.f.d. and 8 BWPD, 16/64-in. choke, 4,619-31 ft. Atoka; 5,205-27 ft. Morrow gas. Monocline. Net thickness pay 12 ft. Deepest formation tested Mississippian. Dual discovery well of field. This well opened first production along Las Animas arch.

4. Colt Morrow gas field, Kiowa County, 4 miles east of Arlington. Jones & Armell-Pan American 1 Bolton-Lamberson, C SE SE 7-20s-52w, completed 1956. IPF 554 M.c.f.d., 5,292-5,302 ft. TD 5,682 ft. Net thickness of pay 10 ft., deepest formation tested Mississippian.

5. Greenwood Virgil Pennsylvanian gas field, Baca County, Colorado, and Norton County, Kansas. Amerada 1 Neu, SE NW 33-32s-41w, completed as first Colorado portion well of Greenwood field. IPF 2,700 M.c.f.d., 11-ft. sand in Topeka at 3,106 ft. Completed 1954.

6. Lubers Cherokee gas field, Bent County. 2½ miles west of McClave. D. D. Harrington 1-A Carl Earl, C SW NE 15-22s-49w, completed 1956. IPF 10 M.M.c.f.d., 4,430-42 ft. Net pay thickness 12 ft., deepest test Mississippian.

7. Lubers Morrow gas field Northwest, Bent County, 2½ miles southwest of McClave. Holly Drilling Co. 1 Wilson, C NE SW 22-22s-49w, completed 1957. IPF 560 M.c.f.d., 4,629-80 ft. TD 4,765 ft. Net pay thickness 16 ft., deepest test Mississippian.

8. McClave Marmaton oil field, Kiowa County, 20 miles northwest of Lamar. Continental Oil Co. 1 Lynn, C SE NW 13-20s-49w, completed 1957. IPP 60 BOPD, 4,232-54 ft., 39°, net pay thickness 22 ft., deepest test Mississippian. This well flowed 3,500 M.c.f.d., Morrow 4,834-46 ft. When the oil zone gave out, the well was abandoned, later recompleted in 1959 by Frankfort Oil Co. as a gasser.

9. McClave Morrow gas field, Kiowa County, 20 miles northwest of Lamar. Continental 1 McClave, SE SE SE 11-20s-49w, completed 1952. IPF 357 M.c.f.d., 4,870-86 ft. Structure monocline, deepest formation tested Reagan Cambrian sand. Discovery abandoned in 1958. In 1957 the field was extended 4 miles southeast at Harrington 1-A Morse in C SE NW 28-20s-48w. It flowed 5 M.M.c.f.d. from Morrow 4,728-40 ft. Again extended 5 miles northeast at 1-A State in NE SW 34-19s-48w, IPF 5,400 M.c.f.d. 4,725-35 ft. Now has 12 wells.

10. Prairie Dog Marmaton oil and gas field, Baca County, 24 miles southeast of Springfield. Shell Oil Co. 1 Federal Land Bank, C SE NE 31-34s-44w, completed 1958. IPF 4 BO and 855 M.c.f.d., 4,096-4,102 ft.; IPF 19 BO and 915 M.c.f.d., 4,113-18 ft. Pay thickness 13 ft., deepest test Mississippian. Two producers. Second well, Shell 1 Copenhaver, 6-35s-44w, flowed 2,200 M.c.f.d. 4,049-58 ft. and 4,064-74 ft. in Marmaton.

11. Frankfort Oil Co. 1-9 State, SE NW 9-21s-28w, 12 miles northwest of Lamar, 7 miles southeast of McClave field. IPF 200 BO/10 hours 4,744-54 ft. McClave sand. Bent County. Completed 1960.

12. J. H. Huber Corp. 1 Stubbs, Kiowa County, NW NW 15-19s-45w. Completed 1959. IPP 69 BOPD, 3,682-84 ft. in Lansing, 36°, 30 miles southeast of Eads, 25 miles west of Clift field of Greeley County, Kansas, 33 miles east of McClave field. Brandon Lansing-Kansas City oil field.

13. Horizon 1-22 C. V. Cogburn, C NW NW 22-33s-42w, Baca County, completed 1960. IPF 7 M.M.c.f.d., Morrow and Topeka 3,021-36 and 4,674 ft. Location is 7 miles northwest of South Greenwood field and 11 miles north of Keyes gas field of Oklahoma.

1. Horizon Oil & Gas Co. 1 Newman-A, NE SW 26-32s-42w, Midway field. IPF 3,600 M.c.f.d., Topeka Pennsylvanian 3,158-70 ft. TD 3,400 ft.

2. Horizon 1-34 Neu, C SE 34-32s-42w, Midway field. IPF 2,550 M.c.f.d., Topeka 3,138-46 ft. TD 3,400 ft.

3. Horizon 1-35 Prentice, NE SW 35-32s-42w, Midway field. IPF 5,500 M.c.f.d., Topeka 3,136-48 ft. TD 3,250 ft.

4. Horizon 1 12 Trahern, C NW SE 12-32s-43w. IPF 2,600 M.c.f.d., Topeka 3,205-20 ft. TD 3,250 ft. New field.

5. Horizon 1 Lepel-A, NW SE 3-32s-44w. IPF 6,700 M.c.f.d., Topeka 3,329-41 ft. TD 3,600 ft. Unnamed field.

6. Horizon 1-3 Bauman-B, E½ SE 3-33s-42w, Midway field. IPF 7,700 M.c.f.d., Topeka 3,142-48 ft. TD 3,250 ft.

7. Horizon 1-4 Cogburn-B, C SE 4-33s-42w, Midway field. IPF 670 M.c.f.d., Topeka 3,170-76 ftt. TD 3,400 ft.

8. Horizon 1-10 Pemble-Jenkins, SW NE 10-33s-42w, Midway field. IPF 1,100 M.c.f.d., Topeka 3,070-80 ft. TD 3,254 ft.

9. Horizon 1 Holmes-A, C NW 26-33s-42w, Midway field. IPF 1,150 M.c.f.d., Topeka 3,041-56 ft. TD 3,250 ft.

10. Horizon 1-27 Greer, C NW 27-33s-42w, Midway field. IPF 1,900 M.c.f.d., Topeka 3,038-60 ft. TD 5,110 ft.

11. Horizon 1-28 Jenkins, SE NW 28-34s-41w, South Greenwood field. IPF 2,350 M.c.f.d., Topeka 2,776-84 ft. TD 3,150 ft.

12. Horizon 1-29 Michael, SE NW 29-34s-41w, Greenwood field. IPF 800 M.c.f.d., Topeka 2,814-23 ft. TD 3,113 ft.

13. Horizon 1 Tevebaugh, C NW SE 7-34s-42w. Flank field discovery. IPF 106 BOPD, Morrow Pennsylvanian 4,691-94 ft. TD 5,131 ft. New field.

West Texas gets important discovery

One of the most significant discoveries in West Texas this year is Williamson Petroleum Co. and Brunner & Holmes 1 Owens, southeastern Upton County wildcat. The Fusselman Silurian well, 1½ miles north of Rankin, flowed 7

M.M.c.f.d. and 462 bbl. of condensate per day from perforations at 10,892-10,932 ft.

This well is in Section 22, Block B, HE&WT Survey, 1¾ miles west of the recent Strawn Pennsylvanian discovery at Blue Danube Oil Co. 1 Neal.

Reeves County. Gulf Oil Corp. 1-C Jack Frost was completed as the second well in new West Waha-Delaware Permian field in northern Reeves County, 16 miles southwest of Pyote.

The well flowed 154 bbl. of oil plus 6% water per day on 11/64-in. choke from perforations at 5,010-30 ft. It is the northwest offset to the field discovery well, American Trading & Production Corp. 1 Bodkins. Location is in Section 3, Block C-4, PSLY Survey.

Coke County, West Texas, has new Canyon production

New Canyon sand production is reported at a wildcat in Coke County, West Texas. The discovery well is Tucker Drilling Co. 1 Mary G. Hays, on the Robert McRea Survey 1596, 8 miles northwest of Robert Lee and 1½ miles northeast of I.A.B. Northeast-5,100-ft. Pennsylvanian field.

Tucker's discovery flowed 143 bbl. of 43°-gravity oil per day on 14/64-in. choke from perforations at 5,001-5 ft.

Scurry County. Fenix & Scisson, Inc., have a new Strawn Pennsylvanian reef discovery in northern Scurry County, 2 miles northeast of Snyder.

The 1 Jennie Coffee flowed 189 bbl. of 39°-gravity oil per day on test through 16/64-in. choke from perforations at 7,157-72 ft. Location is in Section 121, Block 3, H&GN Survey. The well is 1½ miles east of Kelly Snyder field and 1¼ miles southwest of Towle field.

Brown-Bassett moves. Big Brown-Bassett field, Terrell County, was extended 2 miles south at Shell Oil Co. 1-331 Mitchell, 25 miles south of Sheffield.

The important long extension flowed 9 M.M.c.f.d. from Ellenburger Cambro-Ordovician from open hole at 12,900-14,308 ft. Location is in the southwest corner of Section 331, TWNG Survey.

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And while other exploration services end on the derrick floor, the utility of *Core Analysis* goes on and on. Long after you have applied this *direct* down-hole information to immediate drilling, testing, and completion decisions, you'll find its availability a virtual windfall through development, financing, and optimum depletion practices.

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UNITED STATES CANADA SOUTH AMERICA EUROPE AFRICA

Freighter converted to unique drilling platform

OFFSHORE drilling activity on Lake Erie features a unique type of drilling platform.

A converted lake freighter equipped with a full-scale drilling rig, tons of air compressors, high-capacity pumps and generators is in use.

The drilling operations are exploratory in nature and are being conducted along the Canadian side of the lake from Port Colborne to Port Dover, Ont. The target is gas.

The converted freighter commissioned the SIMCOE has been on 11 drilling locations as of early September. Activity started in May. El Paso Natural Gas Products Co. of El Paso, contracted for the exploration. Contractor for the drilling is the Northern Offshore Drilling Co., Ltd.

Of the 11 attempts, five had yielded gas with production varying from 250 to 600 M.c.f.d., ranging from 3-6 miles offshore. There are wells reportedly yielding up to 5 M.M.c.f.d. on Lake Erie although they are isolated cases. El Paso is testing for similar production. They're trying in deeper water.

SIMCOE has the job and she's loaded with the machinery to do the job. It was outfitted for service under the direction of the drilling contractor. She is heavily diesel—mostly GM diesel. GM's of 16V size power two high-capacity Halliburton cementing pumps which have remained on board through the whole expedition. Four Gardner - Denver air compressors provide air for drilling. Electrical power on board is provided by two diesel electric gen-

SIMCOE LOOKS LIKE THIS from the deck of the tug-crewboat **PAULA M.**

THE SIMCOE is a 250-ft. converted lake freighter equipped with a full-scale drilling rig, compressors, pumps, and generators.

Lake Erie drillers, since becoming familiar with drilling procedures on the lake, have averaged about one well every 6 days. Fracturing is generally the rule.

erator sets. All this machinery is stored forward in the hold.

On deck the drilling rig is located almost amidship. It is an Ideal with a twin GM driving a compound hook up of mud pump which in this case pumps water and drives the rotary table and draw works. Consequently air or water can be used as the circulating force.

To complete the rundown on equipment are two American cranes, each within range of the drilling platform and performing vital hoisting services.

It's no small job when you figure SIMCOE has about 11,500 ft. of 4½-in. production pipe, casing, 2,000 bags of cement, and an assortment of drill bits and connections. Diesel fuel is carried in two 16,500-gal. rail-car tankers (minus rail car of course). The idea was to take enough supplies to carry them through the entire summer's operation. It has—no major supplies have been required.

The SIMCOE is a British-built freighter with service as a lake freighter dating back to 1923. She measures 250 by 43 ft. It is what is known on the Great Lakes as a canaler. Canalers at one time were the largest ships capable of negotiating the canals and connecting links of the Greak Lakes system. Today with the completion of the St. Lawrence Seaway, canals and connecting links have been made deeper. Larger boats now go where canalers once held the upper hand. In many instances shipping firms are rendering them obsolete as they are unable to match the cargo capabilities of these large carriers. The smaller canalers are going out of service at a fast rate, piling up at major lake ports and cities on the Great Lakes. The SIMCOE was in service as a freighter under another name. She was then converted and became the drilling rig she is today.

Beneath the drilling platform amidship, the SIMCOE has been cut away to the water leaving an opening of about 15-ft. diameter. Plate steel welded together in a cylinder forms a core that goes right down to the water and welds to the hull, making the ship watertight.

The company is employing 3 8-hour crews. The ship is without crew quarters so a crew boat service has been established. The ship has a galley, shelter, and offices and radio shack for El Paso engineers in charge.

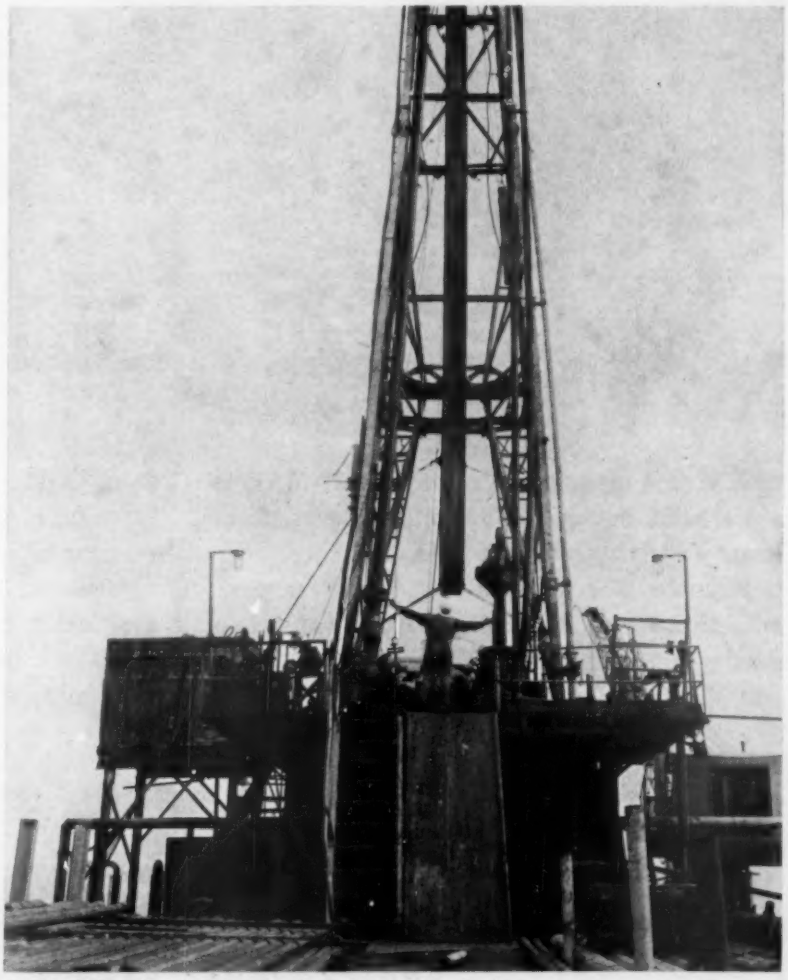
The drillers, since becoming familiar with drilling procedures on the lake, have averaged about one well attempt every 6 days. Fracturing is generally the rule.

Surface pipe on the average hole is set to about 250 ft. (8⅝). Cementing makes the hole watertight and total depth is then generally made using a 6¾-in. bit. Total depth has been about 1,100 ft. each time and, if feasible, production pipe of 4½-in. is set.

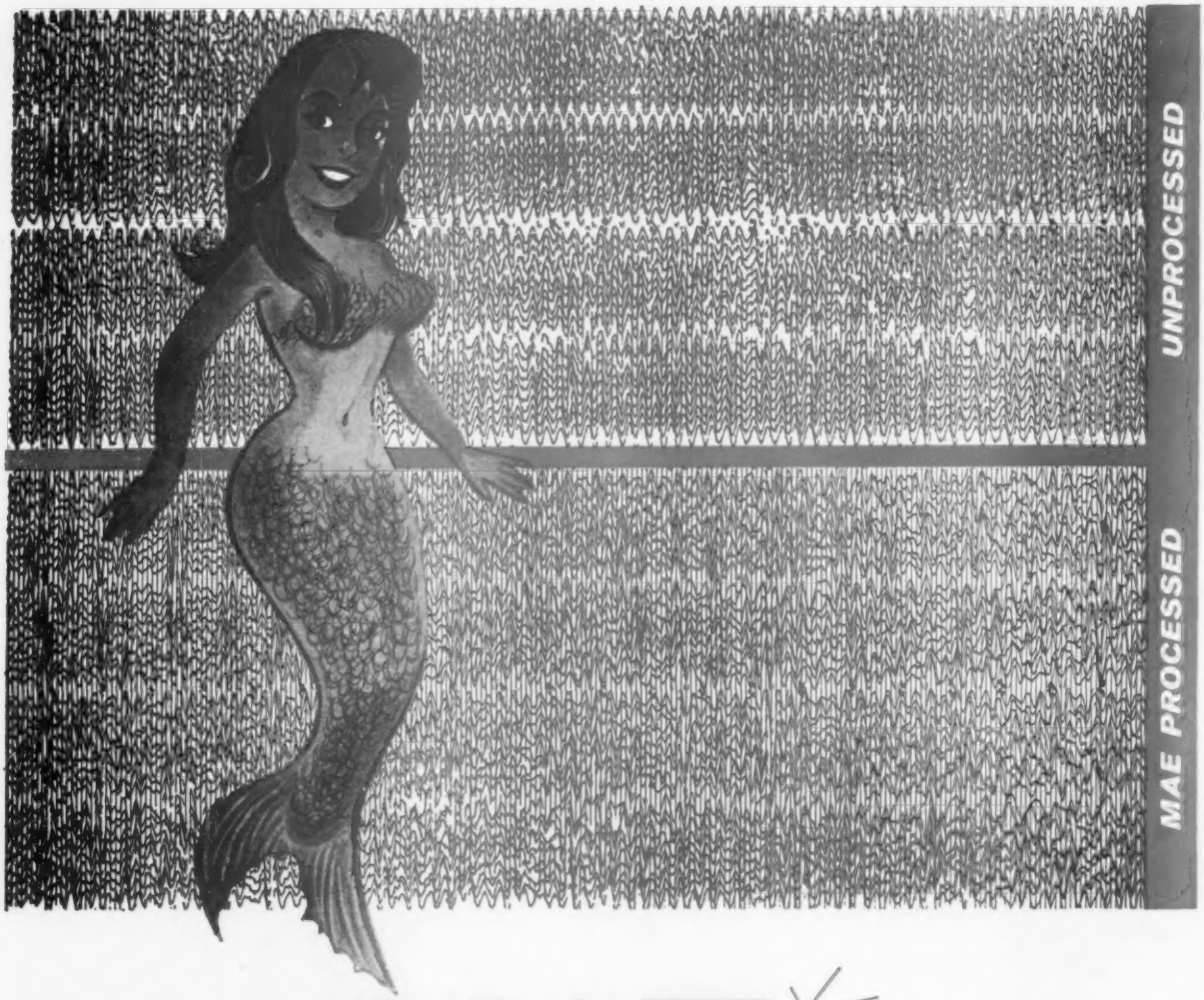
Everything, including Halliburton's two high-capacity pumps and equipment for logging the hole, is kept on board.

The SIMCOE is held stationary on drilling location by five 5-ton anchors hooked into the lake bottom. Two extend diagonally out from the bow, two out from the stern, and one full astern.

The SIMCOE is without propulsion power. She is towed by the PAULA M, a 53-ft. steel tug owned and operated by Powell Shipyard, Ltd., Dunnville, Ont. The tug doubles as a crew boat.



OPERATION of the drilling platform being shown above was cementing for a dry hole to begin drilling for total depth.



what can MAE* mean to you

Who said mermaids were mythical? MAE is a mermaid, but marine seismic explorationists know she's anything but a legend!

In areas where water reverberations mask reflections from depth, MAE (GSI's Multiple Analyzer Eliminator) is not only a fact, but a definite factor in providing workable seismic data. GSI . . . *and only GSI* offers the advantages of MAE, and MAE-processing can only be accomplished if the special recording techniques used on GSI vessels in both hemispheres are used in the original data gathering.

Make a date to meet MAE . . . she'll make your marine operations run smoother.

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Another Texas salt dome is productive

THE SEVENTH of East Texas' 18 known salt domes finally has proved productive.

It is the large Brooks dome in the southwest corner of Smith County where Humble Oil & Refining Co. has completed a small pumper on the northwest flank.

The discovery well, 3 Wendlandt, is productive from Paluxy sand at 8,046-54 ft. after drilling to 12,621 ft. It is making 26 bbl. daily of 26.4°-gravity oil.

The discovery climaxes the drilling of more than 15 tests on and around the flanks of this dome since 1959. The well is Humble's third test in this particular sector, on the northwest flank, of the dome. It lies about midway between the other two: 1 Wendlandt, abandoned in May 1959 at 2,366 ft., and No. 2, which was dry at 5,018 ft. in August 1960.

Humble has drilled two other tests, located on the southwest flank: Maxwell Herring Drilling Co. has drilled two tests on the northeast flank, and John Voight and associates eight tests on the east and southeast flanks, 3 miles across the dome from Humble's discovery.

Voight's latest test, 3 Baker, also on the southeast flank, is drilling below 9,600 ft. and scheduled to go to 10,200 ft.

Included in the list of East Texas domes proved productive so far are Boggy Creek, on the Anderson-Cherokee county line; Bethel and Concord, both also in Anderson County; Butler and Oakwood, in Freestone County; and Hainesville in Wood County.

Texas adds dual-zone find

A dual-zone gas-discovery well has been completed a mile northwest of Coloma Creek field, northeast of Seadrift, in Calhoun County, on the Central Texas coast.

It is Coloma Oil & Gas Corp.'s 1 John Stofer, productive from perforations at 7,719-22 ft. in the upper zone, and 8,534-38 ft., 8,545-51 ft., and 8,562-72 ft. in the lower zone.

Open-flow potentials are 13 M.M.c.f. and 7,400 M.c.f.d., respectively, with shut-in pressures of 2,387 and 3,043 psi.

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Have you seen CARBOSE MX at work? This specially modified form of CMC was developed specifically for drilling muds. It reduces water loss. It's good for mud. It's made for mud. Try it in yours . . . and see what a difference a Wyandotte Key Chemical can make.
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Action in Appalachian basin sets

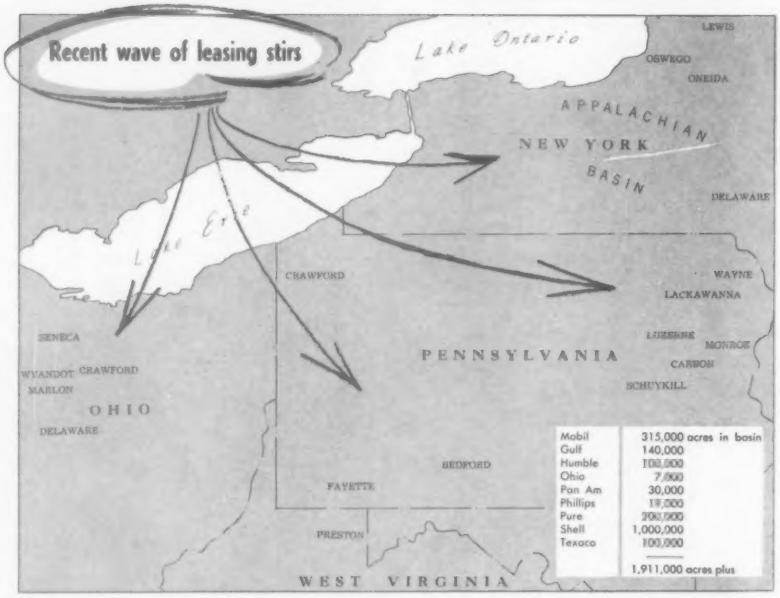
EXPLORATORY, development-drilling, and leasing news is picking up momentum in the Appalachian basin.

Northwestern Pennsylvania. Seven of the dozen completions during September in Pennsylvania's deep-well area were drilled in Crawford County where the Indian Springs trend is still getting a good play.

The largest producer yet here is Burnham Gas Co.'s Dr. Sims well. It found 9,184 M.c.f.d. in the Red Medina sand at 3,556 ft. Rock pressure was 1,140 psi. A second good gasser, 1 Harry Ranson, drilled by Sylvania, found 7,791 M.c.f.d. in the Red Medina at 3,506 ft. This well bottomed at 3,520 ft. still in the sand. The third field well in Indian Springs pool was Sylvania's A. Johnson. This one found 446 M.c.f.d. in the Red Medina and 30 gal. salt water per hour.

The other four completions in Crawford County were wildcats. Lake Shore Pipeline Co. got 300 M.c.f.d. and 7 bbl. of oil after fracture in the White Medina at the W. E. Hart well. This one is located on the Indian Springs trend, and is a stepout about 6 miles to the southwest of the field proper. A second wildcat on this same trend, but 7 miles northeast of the field, found a show of oil and 300 M.c.f.d. in the Medina. Top of the Medina was at 3,741 ft. at the McClusky et al. C. Hlopick well. A third wildcat drilled on the Page farm by Benedum-Trees Oil Co. made 101 M.c.f.d. and 15 bbl. of oil from the Medina section. These wildcats have outlined a considerable area in northwestern Crawford County. This area has all the indications of becoming a fair-sized pool producing mostly Medina gas.

In 1959, the Halfast wildcat well, drilled by Alabaugh et al. in Rome Township, Crawford County, was drilled through the Upper Devonian sands. Drilling was suspended. Last June, drilling was resumed, but the well was recently quit at 5,340 ft. after drilling into the Upper Ordovician. A gas show was found in the Silurian section.



THE APPALACHIAN BASIN is one of the country's most active gas-hunting provinces this year. A wave of leasing is sweeping from Ohio northeastward into New York State, promising even more drilling activity in the near future.

Laurel Hill anticline. Two wildcats were completed at widely separated points, about 80 miles on this anticline. The northernmost is in Clearfield County on the Clearfield Trust Co. property. It was drilled and abandoned at 7,836 ft. by New York State Natural Gas Co. The Oriskany was found dry. The other wildcat here was Phillips Petroleum Co.'s State Tract 98 No. 1 in Cook Township, Westmoreland County. This one found 440 M.c.f.d. after fracturing the Onondaga chert.

Deep well. The second deep test ever drilled in Allegheny County was drilled on the Houston-Starr farm by Albert Starr in Monroeville Township. This test was abandoned after finding a small gas show in the Oriskany.

Erie County. A wildcat was drilled in Amity Township on the Tomcho farm by World Wide Drilling Co. It was abandoned after finding a show of gas in the White Medina.

Cameron County. A recent discovery just north of the Hicks Run pool had its confirmation well at New York State 5 Pardee estate in Shippen Township. The gasser made 18,762 M.c.f.d. after fracture in the Oriskany. Rock pressure was 3,866 psi. in 77 hours.

Leasing Play Continues

The leasing wave in the Appalachian basin continues. New majors and independents are establishing themselves in the region. A brief look at the areas under lease shows that Gulf Oil Corp. has leased over 140,000 acres in Delaware County and vicinity in New York State and is still leasing in the area. Humble Oil & Refining Co. has leased over 100,000 acres in Oswego, Oneida, and Lewis counties, New York. Kerr-McGee Oil Industries, Inc., has considerable acreage in the Valley and Ridge province of Pennsylvania and West Virginia. Mobil Oil Co. has leased about 315,000 acres in the basin with 183,000 acres in Pennsylvania. Ohio Oil Co. has 7,000 acres leased in the Valley and Ridge province of Pennsylvania. Pan American Petroleum Corp. has leased 30,000 acres in Delaware, Crawford, and Seneca counties, Ohio, and are continuing to lease the area. They hope to pick up a total of 150,000 acres. Phillips has leased over 19,000 acres in

fast pace

Monroe County, Pennsylvania. Pure Oil Co. has over 100,000 acres leased in Ohio and over 100,000 acres leased in eastern Pennsylvania's Lackawanna, Carbon, Monroe, Schuylkill, Wayne, and Luzerne counties. Shell Oil Co. has leased over 1,000,000 acres in the Valley and Ridge province. Sun Oil Co. has acreage in Crawford and Fayette counties, Pennsylvania, and in Preston County, West Virginia. Texaco Inc. has ½ interest in 80,000 acres in northwestern Pennsylvania. They also have 20,000 acres leased in Wyandot and Marion counties, Ohio. Tidewater Oil Co. has considerable acreage in Bedford County, Pennsylvania.

Geophysical Activity

Geophysical activity has increased along the Atlantic Coast from Long Island, New York, to North Carolina. Five crews have been working along the coast. Interested companies are Pure, Shell, Tenneco, and Western Geophysical Co. Eleven other geophysical crews are working in the basin.

New Commission Set Up

Gov. David L. Lawrence of Pennsylvania set up a new six-man Oil and Gas Conservation Commission October 3 in a move aimed at spurring expansion of the state's oil and gas industries. Named to the commission were: Thomas G. Johnson, a Shell Oil Co. lawyer, W. Floyd Clinger, president of the Warren Bank and Trust Co., Willem E. Snee, an oil producer, Charles P. Duncan, Jr., chief geologist with Manufacturers Light & Heat Co., James R. Wylie, vice president and general manager of Benedum-Trees Oil Co., Harold J. Magner, vice president of the Delta Drilling Co. The appointments require confirmation by the state senate. This oil and gas conservation measure became effective September 25.

Sooner drilling remains active

OKLAHOMA DRILLING continues brisk in all sectors. Particularly active are the northwest and south-central counties of the state.

Northwest. Ashland Oil & Refining Co. 1 Howell, C NE SW 20-17n-17w, West Valley Center field, Dewey County, moves that field another mile to the southeast.

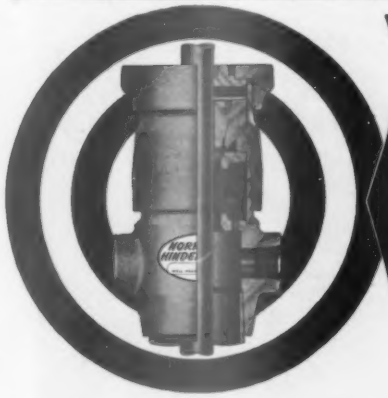
The well flowed 1,020 M.c.f.d. during drill-stem test of the Oswego at 8,972-9,220 ft.

In the linkup area of Southeast Floris and South Forgan fields in Beaver County, Oklahoma Panhandle, Anadarko Production Co. gaged 170 bbl. of oil in 8 hours from Marmaton Pennsylvanian lime at the 1 Blakemore—E in C NE SW 6-4n-23eCM. The Morrow zone was flowing up to 6,640 M.c.f.d. earlier at 6,380-94 ft.

Again in West Valley Center, Dewey County, Humble Oil & Refining Co. confirmed an Oswego lime discovery west of the area at 1 Estee in C SW NE 2-17n-19w. This well flowed 2,800 M.c.f.d. and some condensate. The discovery well, 1 Barnes, C NW SE 34-18n-19w, flowed 6 M.M.c.f.d. and 137 bbl. condensate per day on 33/64-in. choke.

In Cimarron County, Baker & Taylor Drilling Co. completed 1 Hanes in C NE SW 2-3n-9eCM, Northwest Midwell field. This new Morrow sand gasser flowed 3,500 M.c.f.d. from Middle Morrow sand at 4,283-95 ft. and 9,500 M.c.f.d. from Lower Morrow at 4,542-56 ft. This is the second Morrow gas well in this field. The Middle Morrow pay is new for the field. The discovery well was Texaco Inc. 1 Hanes, C NW NE 10-3n-9eCM, a producer at 4,545-50 ft.

An-Son Petroleum Co. tested 1 Galbreath in C SE NW 14-27n-25w, on the south side of Doby Springs field, Harper County. The Chester Mississippian lime made up to 4,500 M.c.f.d. from perforations at 6,617-6 770 ft.



The "OILWELL" string . . . PRODUCTS SERVICES STORES

Every sucker rod a stretcher case?

We can't resist saying "stretcher case" because it refers to an "Oilwell" exclusive in sucker rod manufacture. Only "Oilwell" *stretch-straightens* rods (grades "Y," "T" and "O"), while at tempering heat. Why? To avoid introducing internal stresses that can be caused by cold straightening; and to cull out rods with surface defects (which show up most clearly when the rod is hot stretched).

Hot stretch-straightening is only one of the many reasons why "Oilwell" sucker rods are the most dependable you can buy. And you can choose from five different grades of "Oilwell" rods tailored for specific well conditions:

Grade "Y" for corrosive-inhibited deep wells. These boron-containing rods are "shot peened" as well as liquid quenched, over their entire length. They have both toughness and strength to give maximum service in corrosion-inhibited wells or wells having mild sulphuric brines.

Grade "T" for combatting embrittlement due to sour environment. Liquid-quenching and tempering of this low carbon, nickel content rod increases its fatigue resistance and improves service life in sour wells.

Grade "O" A new "Oilwell" Sucker Rod made of boron alloy steel. Liquid-quenching and tempering imparts exceptional resistance to fatigue under heavy loads. It also performs well under hydrogen embrittlement conditions where inhibitors are used to reduce pitting action.

Grade "L" for carbon dioxide corrosive conditions and medium-to-heavy non-corrosive wells. Made of fully normalized and tempered special nickel-chromium alloy steel, these rods have a "pearlite" grain structure having excellent resistance to carbon dioxide corrosion. Their long runs contribute to a big reduction in pulling costs.

Grade "N" for non-corrosive or inhibited wells. After bar stock has been roll-straightened and rod ends have been formed, these API-"C" rods are normalized to obtain optimum strength, toughness and resistance to shock and fatigue. Will give superior performance in non-corrosive or inhibited wells.

Any well can be pumped economically with one of the five "Oilwell" sucker rods described above. If you want more information, we suggest that you talk to the manager of the "Oilwell" store in your area.

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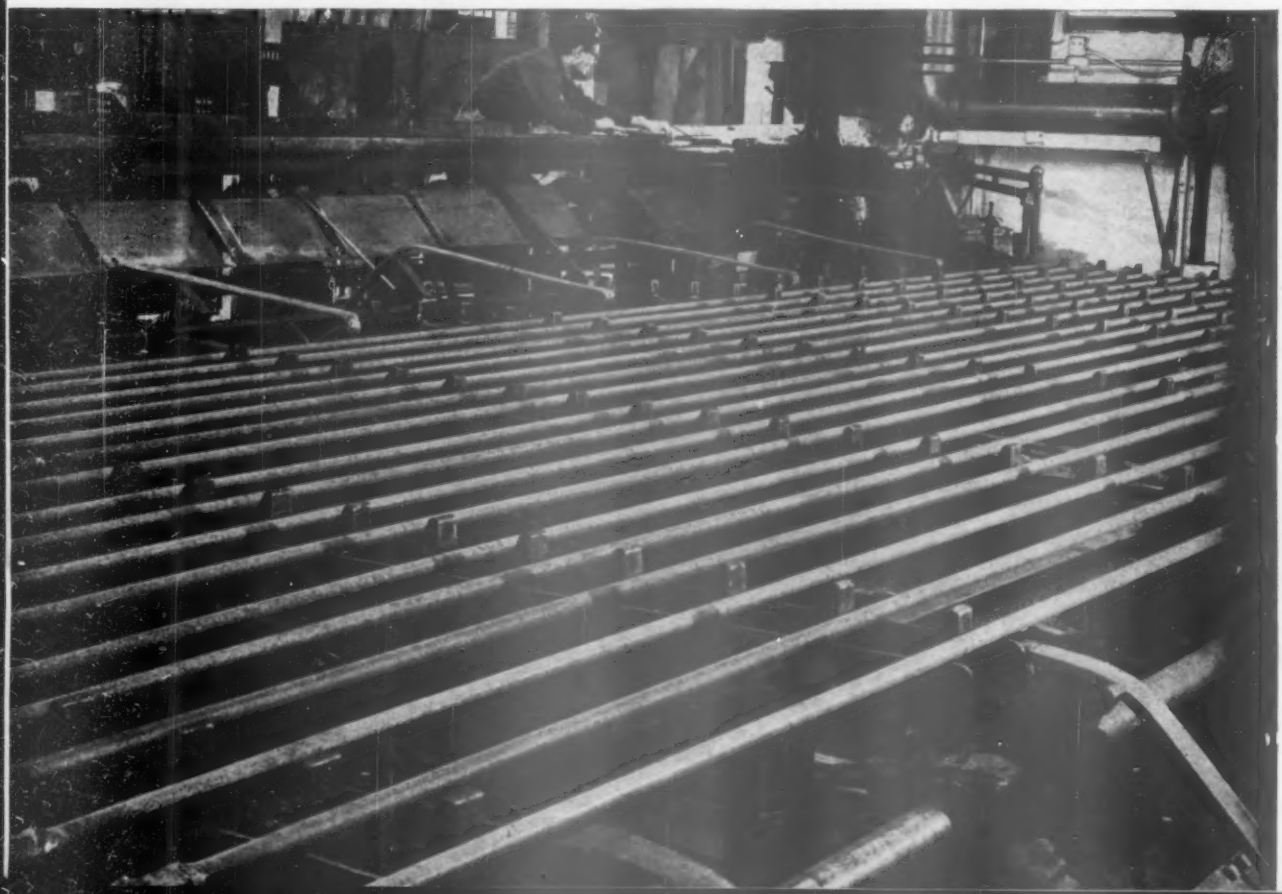
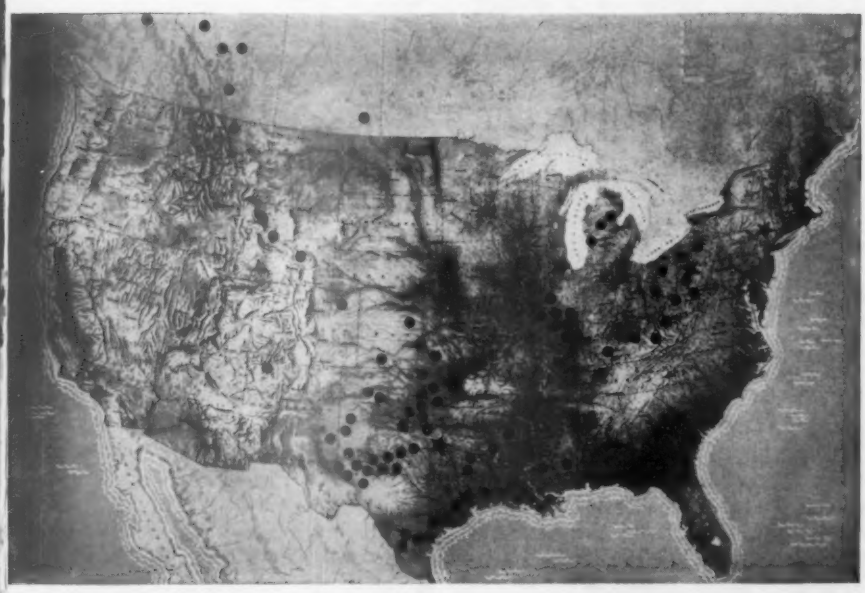


Pump repair where you need it

When you're faced with the repair or reconditioning of any subsurface pump, just get it to the nearest "Oilwell" pump shop. These shops, located for the convenience of our customers, carry complete stocks of quality parts, are equipped with modern tools, and are staffed by experienced pump men. You will find "Oilwell" subsurface pump maintenance service completely satisfying . . . in the quality of the work we do . . . and in its surprisingly reasonable cost.



Where there's oil — there's "Oilwell"

Every dot on the map represents an "Oilwell" store. There's one near practically every important drilling, production, pipeline or processing operation. One is probably within an hour's drive of you now. And there's always stock not more than a night away! The managers and personnel of these conveniently located "Oilwell" supply stores give you not only fast service, but they can usually help with out-of-the-ordinary problems.

USS **Oil Well Supply Division of United States Steel**

Executive and Export Offices: Dallas, Texas

September completions fall to lowest point since April

	Total	Oil	Cond.	Gas	Dry	Service	Footage	Cum. wells 1961	Cum. footage 1961	Cable-tool comp.	D.D.
Alabama	1	0	0	0	1	0	10,250	32	354,251	0	0
Alaska	2	0	0	1	1	0	12,144	32	332,260	0	0
Arizona	1	1	0	0	0	0	5,792	18	43,305	0	0
Arkansas	53	25	0	6	22	0	189,204	383	1,439,077	0	0
California	174	117	0	12	42	3	690,633	1,293	5,619,022	0	16
Colorado	66	12	0	11	43	0	314,180	470	2,237,712	0	4
Florida	0	0	0	0	0	0	0	7	68,620	0	0
Georgia	0	0	0	0	0	0	0	1	4,500	0	0
Illinois	140	59	0	0	77	4	325,558	1,481	3,247,606	18	9
Indiana	66	18	0	0	48	0	106,945	550	802,581	41	3
Kansas	308	157	0	21	117	13	860,097	3,696	9,482,004	78	1
Kentucky	126	34	0	24	61	7	185,057	1,426	1,942,403	98	2
Louisiana	320	108	13	23	172	4	2,150,226	2,845	21,284,384	0	0
North	164	57	2	10	91	4	547,670	1,163	3,880,256	0	0
South	109	29	9	12	59	0	1,123,433	1,262	13,012,423	0	0
Offshore	47	22	2	1	22	0	479,123	420	4,391,705	0	0
Michigan	61	12	0	4	34	11	166,427	573	1,739,847	31	2
Mississippi	38	7	1	2	28	0	355,229	401	3,971,133	0	0
Missouri	3	0	0	0	3	0	4,644	34	57,613	0	0
Montana	41	14	0	1	26	0	213,235	292	1,584,892	0	0
Nebraska	59	10	0	0	49	0	288,570	736	3,350,084	0	0
Nevada	0	0	0	0	0	0	0	14	27,398	0	0
New Mexico	156	78	1	36	41	0	809,846	1,342	6,911,390	35	3
West	60	13	0	35	12	0	314,325	582	2,823,834	14	1
East	96	65	1	1	29	0	495,521	760	4,087,556	21	2
New York	23	13	0	0	0	10	31,050	347	493,933	23	0
North Dakota	20	12	0	0	8	0	114,798	195	1,227,417	0	0
Ohio	78	36	0	21	18	3	197,193	768	1,954,168	67	0
Oklahoma	335	181	5	36	84	29	1,430,405	4,233	14,213,080	34	5
Oregon	0	0	0	0	0	0	0	2	15,295	0	0
Pennsylvania	61	24	0	14	6	17	139,019	464	1,387,602	58	0
South Dakota	0	0	0	0	0	0	0	5	30,908	0	0
Tennessee	3	0	0	1	2	0	2,491	65	49,593	3	0
Texas	1,176	643	30	79	399	25	5,354,366	10,820	48,261,168	41	5
District 1	78	31	1	2	44	0	219,068	674	1,844,693	0	0
District 2	51	21	3	7	20	0	343,178	576	3,832,476	0	0
District 3	94	42	6	10	36	0	671,280	863	5,831,176	0	0
District 4	83	30	1	17	35	0	549,022	896	5,045,650	0	1
East (5 & 6)	69	32	3	2	32	0	364,048	885	4,518,167	0	0
District 7-B	150	75	1	5	69	0	466,326	1,363	4,100,963	14	0
West (7-C & 8)	298	225	1	7	52	13	1,473,907	2,692	13,729,092	16	3
District 9	247	142	12	0	81	12	706,844	1,983	5,183,991	11	1
District 10	106	45	2	29	30	0	560,693	888	4,174,960	0	0
Utah	20	6	0	6	8	0	126,773	182	1,055,121	0	0
Virginia	0	0	0	0	0	0	0	2	8,004	0	0
Washington	3	0	0	0	3	0	15,680	10	41,395	0	0
West Virginia	111	10	0	85	16	0	280,393	780	1,923,403	91	0
Wisconsin	0	0	0	0	0	0	0	6	8,100	0	0
Wyoming	112	48	1	12	51	0	551,331	730	3,664,430	0	1
Total Sept. 1961	**3,557**	**1,625**	**51**	**395**	**1,360**	**126**	**14,932,436**	**34,235**	**138,833,699**	***618**	**51**
Total Aug. 1961	3,988	1,764	60	373	1,480	311	16,574,714	.....	.....	698	54
Cumulative 1961	**34,235**	**15,331**	**673**	**3,410**	**12,428**	**2,393**	**138,833,699**	.....	.....	***6,863**	**601**
Cumulative 1960	34,125	15,364	992	2,811	13,012	1,946	141,969,887	.....	.....	.....	.....

*Estimated

In Woodward County, Natural Gasoline Corp. has the second producer in Northwest Tangier field. The 1 Norman, C SE NW 28-23n-22w, flowed 6,250 M.c.f.d. on 17/64-in. choke from perforations in the Morrow sand at 8,193-8,203 ft. Calculated open-flow potential is 35 M.M.c.f.d. Shell Oil Co. 1 Blasdel was the discovery well of this field in Section 21. That well flowed 8,850 M.c.f.d. from 8,137-51 ft., earlier this year.

Central, South. In Kingfisher County, Continental Oil Co. 1 Whitelog unit, C NE SW 25-16n-8w, on the west side of North Okarche field, flowed 6 M.M.c.f.d. and 48 bbl. condensate per day from Manning at 7,978-96 ft.

Humble 3 Frank Pacula in C SW SE 5-19n-6w, East Hennessey field, flowed 969 bbl. of oil per day on 20/64-in. choke. King-Stevenson Oil & Gas Co. 1 Wiley, C SW NE 19-18n-7w, second try in Northwest Dover field, flowed 2 M.M.c.f.d. from Manning perforations at 7,299-7,302 ft. This is 1 mile north of the discovery well. At East Hennessey, Jones & Pellow Oil Co. 1 Hladik-B, C SW NE 17-19n-6w, flowed 480 bbl. of oil in 24 hours on ¼-in. choke from open hole in the Meramec Mississippian at 6,938-67 ft. This well is on the northeast extension side of the field.

In southern Oklahoma, Kingery Production Co. has a good Bromide Ordovician oiler at Southwest Lewis field, Garvin County. The 1 Tucker, SE SW NW 36-3n-2e, flowed 165

Wildcats—lowest since April

	Total	Oil	Cond.	Gas	Dry	Footage	Cum. 1961	Cum. footage 1961
Alabama	1	0	0	0	1	10,250	8	86,469
Alaska	1	0	0	0	1	5,484	7	65,556
Arizona	0	0	0	0	0	0	10	29,676
Arkansas	12	0	0	0	12	42,962	81	319,611
California	27	1	0	2	24	180,630	199	1,272,421
Colorado	25	0	0	1	24	123,409	216	1,057,386
Florida	0	0	0	0	0	0	7	68,620
Georgia	0	0	0	0	0	0	1	4,500
Illinois	45	10	0	0	35	96,662	339	663,280
Indiana	17	3	0	0	14	23,758	144	188,326
Kansas	45	4	0	2	39	175,014	676	2,664,799
Kentucky	6	4	0	0	2	9,169	97	131,536
Louisiana	66	1	1	0	64	424,524	464	3,874,987
North	40	1	0	0	39	142,229	211	897,144
South	22	0	1	0	21	245,627	212	2,520,609
Offshore	4	0	0	0	4	36,668	41	457,234
Michigan	23	1	0	0	22	71,575	207	642,328
Mississippi	18	0	0	0	18	170,433	143	1,419,118
Missouri	3	0	0	0	3	4,644	33	56,219
Montana	21	0	0	0	21	104,025	138	729,055
Nebraska	40	1	0	0	39	188,885	370	1,720,479
Nevada	0	0	0	0	0	0	13	19,643
New Mexico	23	8	1	1	13	127,784	220	127,784
West	6	2	0	1	3	13,107	70	206,159
East	17	6	1	0	10	114,677	150	973,042
New York	0	0	0	0	0	0	12	38,630
North Dakota	5	1	0	0	4	32,389	50	338,893
Ohio	1	0	0	1	0	3,862	34	112,569
Oklahoma	30	2	0	1	27	121,039	415	2,181,254
Oregon	0	0	0	0	0	0	2	15,295
Pennsylvania	2	0	0	0	2	8,411	36	236,357
South Dakota	0	0	0	0	0	0	5	30,908
Tennessee	3	0	0	1	2	2,491	65	49,593
Texas	252	27	4	14	207	1,468,165	2,289	11,694,653
District 1	36	1	1	2	32	118,510	278	941,905
District 2	15	3	0	1	11	114,821	163	1,117,895
District 3	21	2	0	2	17	207,516	169	1,585,297
District 4	31	3	0	6	22	223,364	222	1,329,157
East (5 & 6)	22	0	0	1	21	130,704	231	1,186,386
District 7-B	45	6	0	0	39	160,071	380	1,337,993
West (7-C & 8)	29	7	0	0	22	224,019	545	2,694,806
District 9	30	2	2	0	26	122,683	210	821,466
District 10	23	3	1	2	17	166,477	91	679,748
Utah	8	0	0	1	7	58,649	81	469,885
Washington	3	0	0	0	3	15,680	10	41,395
West Virginia	1	0	0	0	1	5,184	7	55,495
Wisconsin	0	0	0	0	0	0	6	8,100
Wyoming	43	4	1	3	35	257,082	275	1,517,781
Total Sept. 1961	**721**	**67**	**7**	**27**	**620**	**3,732,160**	**6,660**	**32,984,018**
Total Aug. 1961	800	86	3	27	684	4,027,161	....	....
Cum. 1961	**6,660**	**599**	**69**	**293**	**5,699**	**32,984,018**	....	....
Cum. 1960	7,186	633	78	250	6,225	33,146,373	....	....

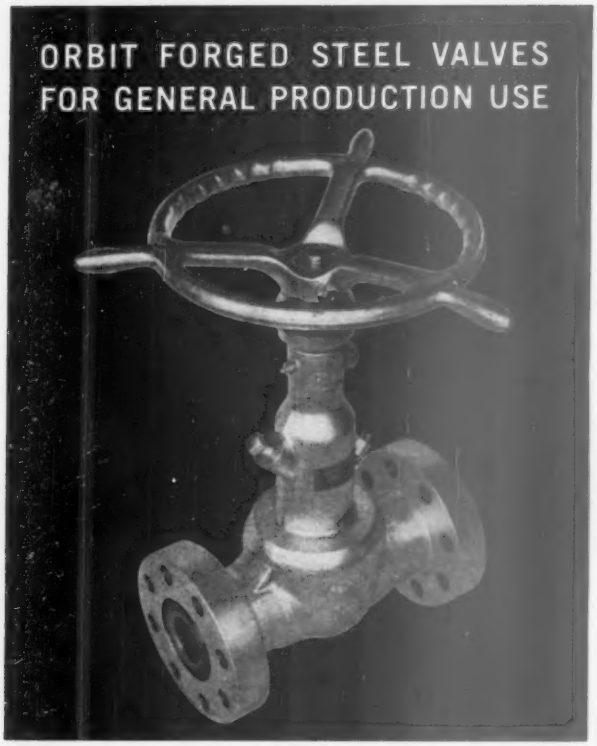
bbl. of oil per day on 14/64-in. choke, natural, from perforations at 2,153-61 ft.

In McClain County, Sun Oil Co. has a new discovery prospect at 1 R. G. Anderson in C NW NW 35-6n-4w, 1½ miles southwest of West Criner field. The well made 27 bbl. of oil per hour on ¼-in. choke during drill-stem test at 11,906-12,001 ft. Jones & Pellow completed 1 Proctor in C NW SW 16-7n-4w, North Dibble field, McClain County, adding a Hart sand pay to the Osborn production already established. The well flowed 28 bbl. of oil per day from Hart sand at 9,587-9,607 ft. The well flowed 600 bbl. per day from Osborn at 9,725-75 ft. on 20/64-in. choke.

Southeastern Oklahoma. Gas production is reported from the Cromwell sand at 1 Sims, a Hefner Production Co. well in C SE NW 17-2n-9e, Coal County. The well, located northeast of shallow gas production at Northwest Centrahoma field, flowed 10 M.M.c.f.d. open flow from Cromwell on a drill-stem test at 5,459-95 ft.

In Middle Centrahoma field, Tenneco Oil Co. 1 Mayer, S½ SE NW 1-1n-9e, Coal County, flowed 4,068 M.c.f.d. on a test at 8,222-27 ft. in the Oil Creek Ordovician sand. This well is ½ mile west of the field discovery well. Operator is now perforating the basal and upper McLish sands.

At Kinta in the Arkoma basin, Haskell County, Ambassador Oil Corp. has production indicated at 1 Wimberly unit, C SW NE 27-8n-19e, Northwest Kinta field. The well flowed 7,940 M.c.f.d. from Spiro perforations at 6,007-40 ft. on ¾-in. choke. Ambassador 1 Richison unit, C NW SE 32-8n-20e, flowed 4,720 M.c.f.d. on ¾-in. choke from Spiro at 5,625-37 ft.



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*Teflon is duPont's registered trademark for its family of fluorocarbon resins, including FEP resin.

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September footage breakdown in U. S.

	Field wells					Wildcats			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	.....	.....	.....	.....	.....	.....	.....	.....	10,250
Alaska	.....	.....	6,660	.....	.....	.....	.....	.....	5,484
Arizona	5,792	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas	75,390	.....	27,784	43,068	.....	.....	.....	.....	42,962
California	343,416	.....	62,347	92,212	12,028	11,264	.....	14,415	154,951
Colorado	59,810	.....	42,048	88,913	.....	.....	.....	6,509	116,900
Illinois	118,212	.....	.....	102,105	8,579	20,959	.....	.....	75,703
Indiana	26,681	.....	.....	56,506	.....	5,812	.....	.....	17,946
Kansas	436,048	.....	58,283	177,079	13,673	16,901	.....	13,501	144,612
Kentucky	22,020	.....	76,749	73,906	4,113	6,341	.....	.....	2,828
Louisiana	611,308	140,732	190,514	774,689	8,459	3,442	11,145	.....	409,937
North	144,613	17,199	44,972	190,198	8,459	3,442	.....	.....	138,787
South	256,476	96,828	130,156	394,346	.....	.....	11,145	.....	234,482
Offshore	210,219	26,705	15,386	190,145	.....	.....	.....	.....	36,668
Michigan	31,620	.....	10,816	30,692	21,724	1,650	.....	.....	69,925
Mississippi	65,731	11,218	26,313	81,534	.....	.....	.....	.....	170,433
Missouri	.....	.....	.....	.....	.....	.....	.....	.....	4,644
Montana	86,715	.....	1,431	21,064	.....	.....	.....	.....	104,025
Nebraska	43,520	.....	.....	56,165	.....	6,458	.....	.....	182,427
New Mexico	348,701	.....	231,273	102,088	.....	37,553	11,536	1,927	76,768
West	51,651	.....	229,648	19,919	.....	5,579	.....	1,927	5,601
East	297,050	.....	1,625	82,169	.....	31,974	11,536	.....	71,167
New York	17,550	.....	.....	.....	13,500	.....	.....	.....	.....
North Dakota	60,402	.....	.....	22,007	.....	10,300	.....	.....	22,089
Ohio	84,654	.....	67,398	34,435	6,844	.....	.....	3,862	.....
Oklahoma	785,044	43,971	186,792	242,440	51,119	10,510	.....	1,626	108,903
Pennsylvania	38,227	.....	53,054	9,854	29,473	.....	.....	.....	8,411
Tennessee	.....	.....	.....	.....	.....	.....	.....	891	1,600
Texas	2,491,182	194,117	352,988	789,848	58,066	193,994	33,030	110,838	1,130,303
District 1	79,736	.....	.....	20,822	.....	3,970	11,785	7,203	95,552
District 2	120,496	20,752	32,686	54,423	.....	29,084	.....	8,006	77,731
District 3	220,537	64,105	46,421	132,701	.....	16,446	.....	20,217	170,853
District 4	152,345	12,250	71,027	90,036	.....	20,736	.....	41,675	160,953
East (5 & 6)	149,739	19,868	7,370	56,367	.....	.....	.....	13,405	117,299
District 7-B	204,606	4,493	21,475	75,681	.....	27,995	.....	.....	132,076
West (7-C & 8)	1,010,474	5,015	35,175	163,631	35,593	65,397	.....	.....	158,622
District 9	373,364	60,550	.....	127,774	22,473	9,697	11,945	.....	101,041
District 10	179,885	7,084	138,834	68,413	.....	20,669	9,300	20,332	116,176
Utah	33,920	.....	32,964	1,240	.....	.....	.....	8,585	50,064
Washington	.....	.....	.....	.....	.....	.....	.....	.....	15,680
West Virginia	20,942	.....	219,523	34,744	.....	.....	.....	.....	5,184
Wyoming	178,365	.....	45,083	70,801	.....	28,962	10,112	19,118	198,890
Total September	**5,985,250**	**390,038**	**1,692,020**	**2,905,390**	**227,578**	**354,146**	**65,823**	**181,272**	**3,130,919**

DISCOVERIES

Kansas

Graham County:

C-G Drilling Co. and Houston Petroleum Co. 1 Bell, SE SE SE 4-10s-24w, 1 mile northeast of Bryant field, 11 miles southeast of Hill City. IPP 145 BOPD, no water, 33.4°, Kansas City lime 3,972-97 ft. TD 4,040 ft. New oil discovery.

Haskell County:

Pan American Petroleum Corp. 1 Miller gas unit "1," C NW SE 33-29s-33w, 3½ miles northeast of Santana. IPF 8,400 M.c.f.d., SITP 1,210 Psi., Des Moines 4,885-87 ft.; IPF 4,500 M.c.f.d., SITP 1,255 psi., Morrow 5,309-11 ft. TD 5,900 ft. New gas discovery, dual completion.

Reno County:

Mull Drilling Co., Inc. 1 Morgan, NE SW 17-22s-8w, 1½ miles southwest of Sterlin pool, 7 miles west of Nickerson. IPP 141 BOPD, no water, 37.6°, conglomerate 3,544-54 ft. TD 3,595 ft. New oil discovery.

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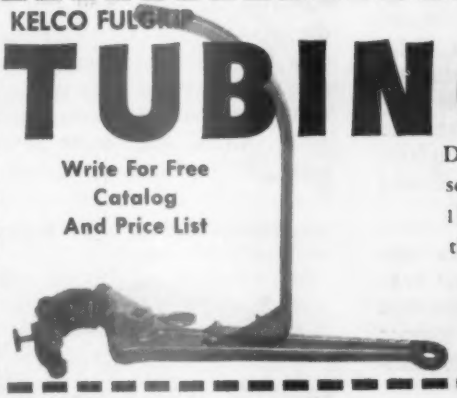

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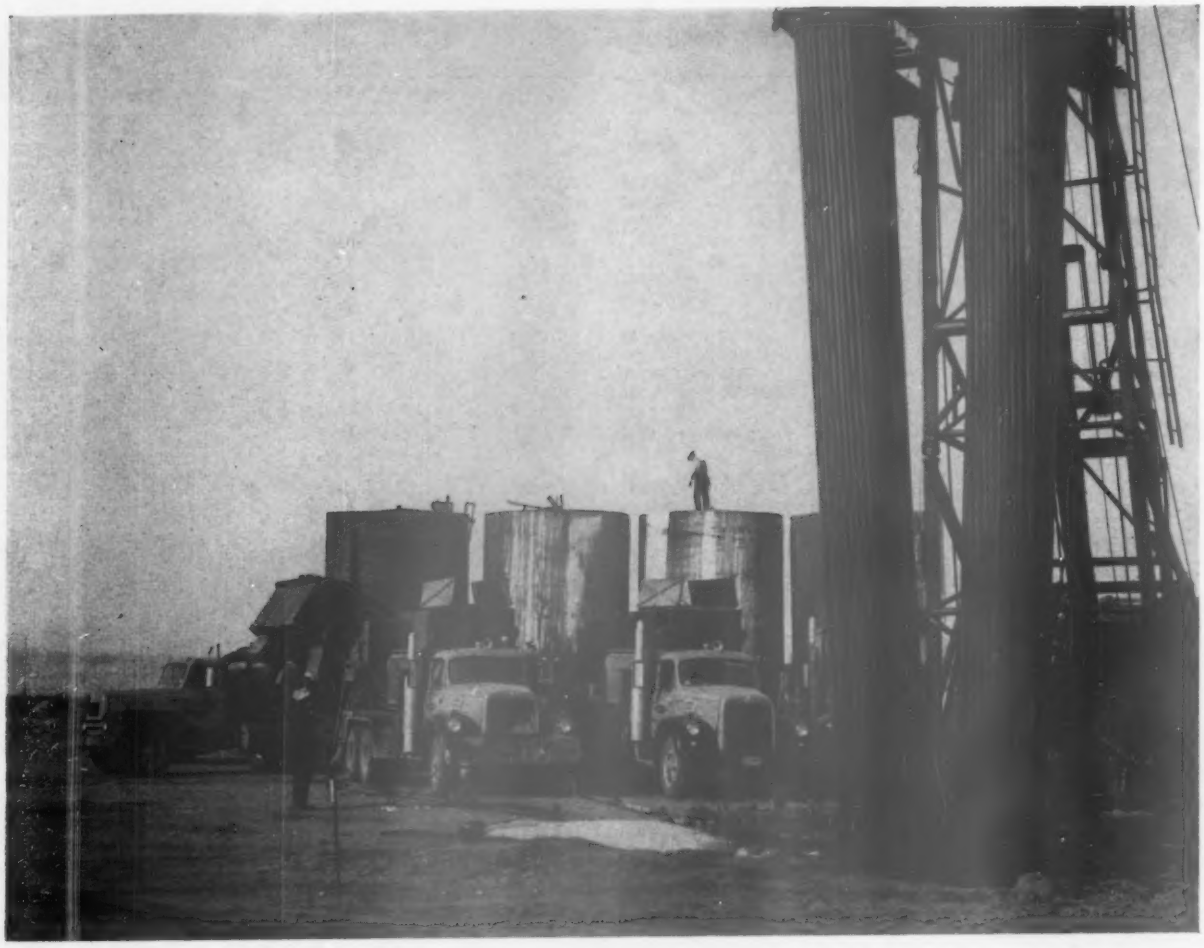

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WATERFRAC fracturing service uses thickened fresh or salt water as the fracturing fluid. Excellent sand-suspending qualities and low fluid loss rates help provide high-efficiency treatments.

ACID PETROFRAC* fracturing service employs a special acid-oil emulsion. The combined fracturing and acidizing action of this service frequently gives better results than either fracturing or acidizing alone. Frac Acid and Duofrac* are other Dowell fracturing services that use acid-base fluids.

RIVERFRAC* fracturing service employs unthickened fresh water to carry the propping agent. Riverfrac is widely used on gas wells because of its low cost and non-contaminating qualities.

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PROFILE

Dr. Paul Reichertz . . . Mobil's Dallas research chief

Exploration research needed

Mobil's Paul Reichertz says need for better exploration methods provides biggest challenge for oil scientists.

A FEW months back research engineers from Mobil's Dallas field research lab and production engineers in the Midland district teamed up to lick a tough corrosion problem in big Brown-Bassett gas field in West Texas.

At the same time, Mobil drilling costs around the world were being cut sharply due to a similar cooperative effort between a research task force and drilling and production personnel.

The same thing has been going on in many other phases of company exploration, production, and drilling.

You can expect it to increase still more. Dr. Paul Reichertz, new manager of Mobil's big Dallas field research facility, is a great believer in the closest kind of working arrangement between research and operating personnel.

"We've made a lot of progress in the Mobil organization," Reichertz says, "but there's still room for lots more. Here's what we hope for eventually: when an operating man needs some help on a job—no matter where he is or what the job is—he will know the name of a man to call at the lab.

"This is the ultimate—and it's a tough thing to accomplish in an international oil company.

"The man at the lab can't and won't tell the operating man what to do. But he can give him added information which can help him decide."

No research cut. Mobil—like nearly every other large oil company—has had to do some retrenching in the past few years. But there's been no cut in numbers of research personnel or in research dollars spent.

Each year the research budget has been higher. And the number of personnel in the big Dallas lab has increased probably 3 to 4%. Reichertz attributes this to recognition by top management that heavy research is required if costs are to be cut significantly.

"Actually," he says, "hiring enough people for the lab has been a problem. Never yet have we been up to desired strength. We've recruited constantly and fiercely, but we're after the very top talent—the same folk pursued by all research-minded companies.

"And we have a tough row to hoe. There is a general lack of public awareness of the technical problems the oil industry has. Physicists, chemists, and mathematicians ask us, 'What kind of problems do you have that you need me?' Everyone knows that Bell Labs, G. E., and Du Pont do research—but not oil companies. We feel if we can get these people out to see our lab, we have the battle half won."

The big need—exploration. Field research in the oil business really is very young, Reichertz contends. "Oh, there have been labs around for a long time. But they spent most of their time servicing operating departments. Mobil, for instance, didn't start production research until 1946. Most of us, like me, had refining-research backgrounds and very little confidence in what we did in the exploration-production field at first.

"Now our department and its equivalent in other companies is really beginning to pay off.

"The biggest need now in oilfield-research work lies in the exploration field. We have oil in the ground now, and we know how to get it out. The real need is to find more. Here is where a breakthrough could really help."

Promotion no surprise. The Reichertz promotion surprised few people. For the past several years, he obviously was being groomed for bigger things.

In 1955, he participated in a Massachusetts Institute of Technology workshop on supervision of research personnel. In 1956-57, he went through Magnolia Petroleum's supervisory-development program. And in 1958, he completed a 5-week executive-development program and a 2-day management-development course.

In between, he sandwiched courses in rapid reading and clear writing.

Reichertz' progress up through the research ranks, first with Magnolia and then with Socony Mobil following the big reorganization, has been fast and steady.

He joined Magnolia in 1943 after earning his doctorate in physics from Brown University, Providence, R. I., and following a short stint as a research investigator for the federal Government working on radar research.

As a research physicist for Mag-

nolia from 1943-46, Reichertz concentrated on catalysis research using X-ray, electron microscope, and diffraction equipment. In 1946, he was named research associate in charge of the reservoir-mechanics group of the production-research division.

In 1951, he was promoted to assistant manager of the production-research division. And in 1956, he jumped to assistant manager of the Dallas research lab and manager of production research.

Two of the more interesting of Reichertz' many industry committee assignments are his membership on a panel on drilling techniques for the NAS Mohole project and on an SEG subcommittee on Russian language translation.

●

Dr. W. A. Sweeney has been promoted to senior research chemist at the Richmond Laboratory of California Research Corp., San Francisco. He joined Calresearch in 1954.

Arthur W. Lucas of New York, vice president of finance for Chemstrand Corp., a wholly owned subsidiary of Monsanto Chemical Co., has been elected a vice president of Monsanto.

New staff members of the central basic research laboratories of Esso Research & Engineering Co., Linden, N. J., are **John M. Matsen,** a chemical engineer, and **Dr. Richard P. Smith,** a chemist. **Dr. M. Larry Campbell** and **Dr. Lawrence E. Gastwirt,** chemical engineers, have joined the staff of the chemicals development division.

Archie D. Gray, Pittsburgh, Pa., senior vice president of Gulf Oil Corp., has retired. Before joining Gulf in 1935, Gray was a district attorney at Waxahachie, Tex., and assistant attorney general of Texas in charge of oil and gas matters. He became general counsel for the oil company in 1953, was elected vice president in 1957 and senior vice presdient in 1958.

Richard F. Rejmaniak, petroleum engineer with Ohio Oil Co., has been transferred to Midland, Tex., from Bay City, Tex.

Esso Research & Engineering Co., Linden, N. J., has named **Dr. Herman Bieber** a research associate. Bieber has been with the company since 1955.

Dr. Charles Pendexter and **Gerald M. Webster** have been named research associates at Jersey Production Research Co., Tulsa. Pendexter, a geologist, joined Jersey in 1951. Webster has been working in the center's geophysical research division since 1949.

A. J. (Tony) Carter, Jr., formerly with the oil division of American Metal Climax, Inc., has opened offices in Denver as consulting petroleum engineer. He will specialize in planning drilling programs, air and gas drilling, completion work, evaluations and operations.

American Oil Co. this week announced appointment of three chief engineers and five head engineers for its general engineering department, Whiting, Ind. Chief engineers are **Arthur W. Goodwin, Robert L. Meuleners,** and **John F. Snuggs.** Head engineers are **Robert Diekman, Joseph Gurawitz, Wilmer M. Duvall, E. J. Stanton,** and **B. E. Brown.**

Charles E. Davis has joined California Research Corp. as research engineer in the Richmond, Calif., laboratory's engine-fuels section. New research engineers in the Richmond lab's refinery technical-service section are **Harold E. Gimpel, Roger O. Pelham,** and **James D. Kellard. Dr. David M. Marquis** has joined the chemicals exploratory-research section, Richmond, as research chemist, and **Dr. Michael A. Sweeney** has joined the petroleum products-research section there as research chemist. At the La Habra, Calif., laboratory, **Thomas A. Edmondson** has been named research engineer in the oil-recovery section, and **William T. Webber** has joined the producing division as research engineer. **David W. Lyche** has joined Calresearch's El Segundo, Calif., laboratory as research engineer in refinery technical-service.

GALLOWAY

RYAN

Three executive-level appointments affecting Humble Oil & Refining Co.'s central-region office in Tulsa have been announced. **James H. Galloway,** general manager of Humble's southwest region, has been named general manager of the central region to replace **R. O. Goodykoontz,** who previously was named vice president in charge of the Esso Standard eastern region. **R. P. Ryan,** central region general counsel, replaces Galloway as general manager of the southwest region in Houston. **A. L. Deaton,** area manager in Humble's Mattoon, Ill., office, replaces Ryan as central-region general counsel.

DEATON

Earl Ziegler has joined Dellson Drilling Co., Denver, as an engineer. He formerly was in the drilling tools division of Phillips Petroleum Co.

Air Products & Chemicals, Inc., Allentown, Pa., has added two new directors. They are **Robert B. Swope** and **Robert P. McMillan,** chairman and president, respectively, of Southern Oxygen Co., which recently was acquired by Air Products.

Hudson's Bay Oil & Gas Co., Ltd., Calgary, has three new executive officers. **Charles A. Perlitz, Jr.,** Houston, executive vice president of Continental Oil Co., has been elected chairman of Hudson's board. He succeeds **L. F. McCollum,** Houston, president of Continental, who continues as a Hudson's director. **J. R. Murray,** Winnipeg, managing director of Hudson's has been named vice chairman, a position which had been vacant. **M. B. Morris,** general manager of the exploration department, has been appointed vice president.

Melvin Kaitz, staff reservoir engineer with Mobil Oil Co. in Houston, will move to New York and become natural gas supervisor in the company's newly formed headquarters natural gas department.

Clayton Nygaard has become district production superintendent in Calgary, Alberta, for Ambassador Oil Corp. He will move to Calgary from Billings, Mont. His experience includes 16 years with Standard Oil (Ohio) and 9 years with Standard Oil (Ind.) in their production and engineering departments.

T. Gerald Harper has been appointed director of planning and economics in the refining department of Gulf Oil Corp.'s Pittsburgh headquarters. He joined Gulf in 1952 at Port Arthur, Tex., and transferred to Pittsburgh in 1958. He became supervisor of the economics section in the refining department last year.

W. W. Crump, seismic party chief for Amerada Petroleum Corp., has been transferred to Greensburg, Kans., from McCook, Neb.

Virgil H. Dolen, Des Moines regional marketing manager for American Oil Co., has been named marketing manager for the Kansas City region of American's Standard Oil division.

John W. McKenna has been appointed products supply manager of the supply and transportation department of Humble Oil & Refining Co.'s southeast region, New Orleans, La. He formerly was head of the petroleum service division, Bayway refinery, Linden, N. J.

R. W. McCanne, division manager of Ohio Oil Co., Casper, has been elected vice president of the Rocky Mountain Oil and Gas Association for Wyoming and South Dakota. He succeeds **Warren A. Morton,** MKM Oil Co. **Leonard L. Aitken, Jr.,** Denver independent, president of RMOGA, and all other officers were reelected at the association's annual meeting in Denver.

Loyd Boyce Perry has joined Continental Oil Co. as production engineer trainee in Ardmore, Okla.

D. F. Dial, Jr., has been transferred to Houston as area engineer with Pure Oil Co. He had been district engineer for Pure at Lafayette, La.

Humble Oil & Refining Co. has promoted **J. M. Shepherd** from production - operations superintendent at Midland, Tex., to district superintendent at Andrews, Tex.

Richard C. Brown has been promoted to coordinator of evaluation and planning for Chemstrand Corp., New York. He joined Chemstrand in 1955 and previously was with Standard Oil (Ind.) at Whiting, Ind.

Robert E. Ash, sales representative for Cities Service Oil Co. in St. Paul, has been promoted to territory supervisor with headquarters in Rice Lake, Wis.

Bob George is new president of the North Dakota Geological Society for 1961-62. He is with the North Dakota Geological Survey. Other officers are: **H. C. Smith,** California Oil Co., vice president; **Charles D. Tyler,** California Oil, secretary; and **Bob Lantz,** Ohio Oil Co., treasurer.

James E. Russell, Russell Engineering Co., Abilene, Tex., has been elected new president of the West Central Texas Oil and Gas Association. **George Straughan,** partner in Lauderdale & Straughan Drilling Co., Abilene, is a new vice president. All other officers were reelected.

Weaver Oil & Gas Corp., Fort Worth, has opened an eastern district office at Butler, Pa. **Joe B. Jamar,** vice president, was transferred from the Canandaigua, N. Y., office to direct Appalachian basin operations. **A. R. Goodgame** is district geologist and **Bob Minor** is land man for the Pennsylvania district. **Kenneth Priest** has been named district geologist and **J. M. Bewley** district land man for New York. **Dr. O. D. Weaver,** president, has moved from Fort Worth to Southport, Conn., to supervise the firm's expanded eastern operations.

Frederick S. Burroughs has been elevated to vice president of the National Oil Fuel Institute, New York. He has been secretary of the organization. Burroughs joined NOFI when it was formed last May by the merger of the National Fueloil Council and Oil Heat Institute of America.

John D. Ratje has been promoted to plant manager for El Paso Natural Gas Products Co., Gallup, N. M. He formerly was assistant plant superintendent at Odessa, Tex.

E. E. Sewell has become production engineer with Cities Service Petroleum Co., Bartlesville, Okla. He formerly was geological engineer with Tenneco Oil Co., Great Bend, Kans.

R. E. Mitchell, area project superintendent for Shell Oil Co. in Houston, has been named superintendent of gas utilization, a new position in the Houston area.

MacMillan Ring-Free Oil Co. has appointed **Paul E. Owens** president and chief executive officer and **Paul W. Rishell** executive vice president and treasurer. Owens formerly was vice president of marketing for American Independent Oil Co., and Rishell was manager of the Western Hemisphere finance division of Esso International.

California Chemical Co., subsidiary of Standard Oil (Calif.) has announced three promotions within its top management. **T. G. Hughes** has become vice president in charge of marketing. **T. M. Welton** succeeds Hughes as president of Cal Chemical's Oronite Division. **H. B. Pollock** replaces Welton as vice president and manager of marketing for Oronite. The new officers have total experience of nearly 88 years with the Standard of California organization.

HUGHES

Two officers have been elected for Dixie Pipeline Co., which is building an 1,100-mile LPG line from Texas to North Carolina. **R. P. Hamilton,** Atlanta, Ga., was elected president, and **Ralph P. Dougherty,** St. Paul, Minn., was named vice president. Hamilton formerly was president of Southeastern Pipe Line Co. at Atlanta. He succeeds **F. B. Neptune,** Phillips Pipe Line Co., who served as Dixie president during the line's organizational phase. Dougherty formerly was with Minnesota Pipe Line Co.

HAMILTON

Robert V. Faith, Eldorado, Kans., has been named superintendent in Kansas for Cities Service Pipe Line Co. He succeeds **W. W. Dulany,** who retired after 44 years of pipelining for Cities Service. Faith has been district engineer at Eldorado for the company.

Charles J. McInerney, secretary of Michigan Wisconsin Pipe Line Co., and **W. Arthur Batten,** secretary of American Louisiana Pipe Line Co., have been elected vice president of their respective firms. **Robert M. Hoffer,** vice president and controller of both companies, was elected financial vice president of both.

K. E. Tappy, manager of the Great Lakes region for Marathon Pipe Line Co., has been appointed manager of the Rocky Mountain region. He succeeds **M. L. Stanfield,** who recently was named vice president of the pipeline. **C. E. Bell,** superintendent of the eastern crude oil pipeline district in the Great Lakes region, succeeds Tappy as Great Lakes manager.

Dr. W. B. Franklin, manager of the technical division at Humble Oil & Refining's Baytown, Tex., refinery, has been named chairman of the advisory council of the University of Texas Engineering Foundation. Council is composed of businessmen who plan and raise funds for various College of Engineering programs, such as supporting faculty salaries and granting scholarships and fellowships.

Ernest E. Cook, geophysicist with Signal Oil & Gas Co., has transferred to Houston. He formerly was on loan to American Independent Oil Co. in Kuwait.

Sam B. Olden, inter-governmental affairs advisor for Socony Mobil Oil Co., has been appointed general manager of Mobil Producing Tunisia. He joined the company's West Africa division in 1951.

Howard Falen, Sioux Falls, S. D., has been elected president of the South Dakota Independent Oil Men's Association. He succeeds **Jesse Suiter** of Pierce. Other officers are: **Dean Lee,** Vermillion, vice president; **Howard Peckham,** Sioux Falls, treasurer; and **Marion van Wyk,** Sioux Falls, assistant secretary.

Dr. Le Roi E. Hutchings has been appointed an associate director of research for Great Lakes Carbon Corp. He will be located at Great Lakes' research center at Morton Grove, Ill. Hutchings previously was associated with Pure Oil Co. as director of the process and product-research division, Crystal Lake, Ill.

Leland T. Jordan, assistant managing director of Kuwait Oil Co., has been honored by Her Majesty, the Queen of England, with an appointment as "Honorary Knight Commander of the Most Excellent Order of the British Empire." Gulf Oil Corp., which released the announcement of the appointment, said it was made in recognition of Jordan's service to British interests in Kuwait. Jordan will retire October 31. Kuwait Oil is owned jointly by Gulf and British Petroleum Co.

Chemicals engineers **Dr. Harry E. Bostian** and **Dr. Robert W. Coughlin** have joined the general engineering division staff of Esso Research & Engineering Co.

Eugene V. Rostow has been elected a director of Texstar Corp. Rostow is dean of Yale Law School and was formerly president of Pyramid Oil & Gas, recently acquired by Texstar.

Garth L. Young, senior vice president of foreign operations for Signal Oil & Gas Co., has been named president of Iricon Agency, Ltd., which represents the 5% holdings of eight companies in the Iranian oil consortium. Young succeeds **T. M. Benton, Jr.,** manager of land and lease for Richfield Oil Corp.

Gulf Oil Corp. has named **William C. King** departmental coordinator for petrochemicals with headquarters in Pittsburgh, Pa. King formerly was director of market research and economic analysis for Gulf. He joined the company in 1948 as a development engineer at the Gulf Research & Development Co. laboratory in Harmarville, Pa.

Mobil Oil Co. has opened an area crude purchasing and sales department at Houston and closed an office at Corpus Christi. **Fred M. Springer,** formerly an area representative at Midland, Tex., has taken over the Houston office. **Paul B. Guenzel,** area representative at Corpus Christi, has retired.

DEATHS

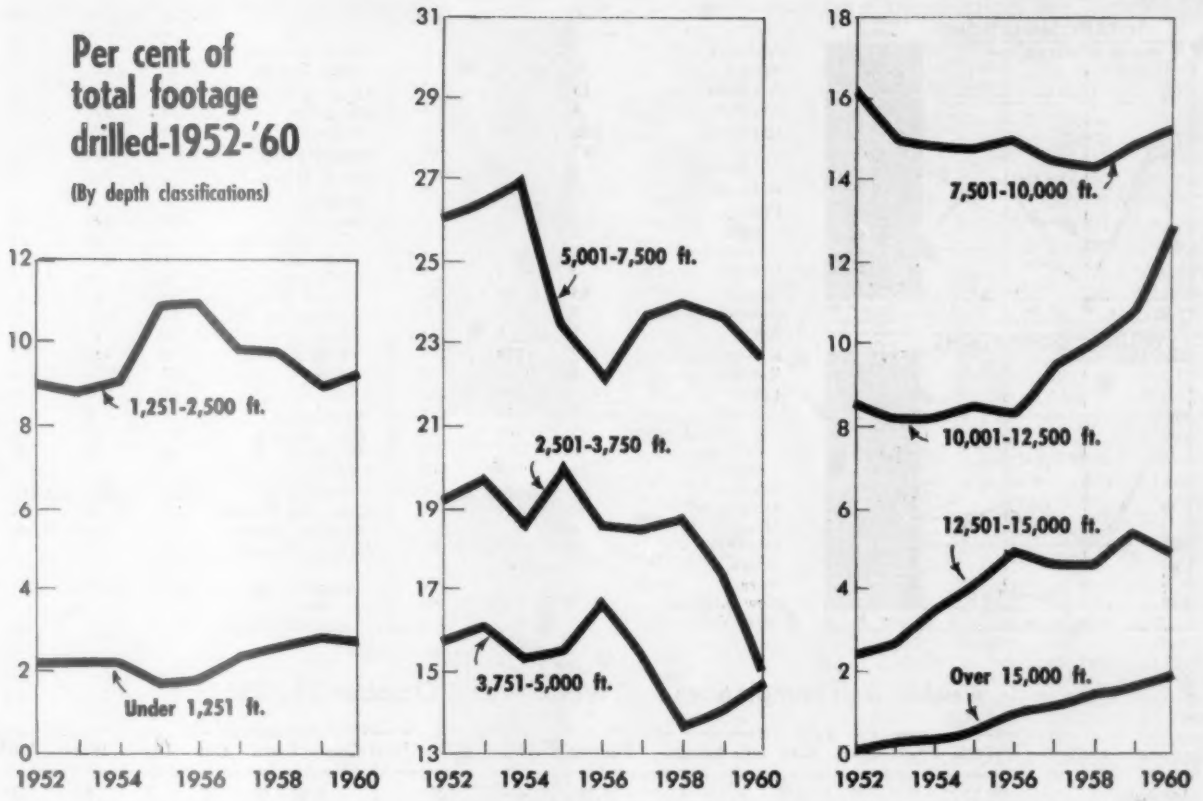
G. R. Whitney, 64, independent oil operator and former president of Chemical Process Co., died October 14 in Breckenridge, Tex. He was a former director of the Texas Mid-Continent and West-Central Texas Oil and Gas associations.

Chester W. Cleveland, 63, former director of public relations for Phillips Petroleum Co., died October 23 at Plymouth, Ind.

William Neil Fox, 61, retired Pasadena, Calif., oil man, died October 10. He was former owner of Fox Oil Co., and distributed products in the Los Angeles area for General Petroleum Corp.

Lloyd Louis Boldt, 52, Tulsa, Shell Oil Co. exploration employe for 25 years, died October 19.

Edgar L. Maddox, 80, retired Tulsa lease broker and oil producer, died October 19.



Net footage gain has been in deep wells

BY JOHN C. CASPER

ALL OF THE net gain in footage drilled for the 1952-60 period was in the deepest classification, over 15,000 ft. The net increase in total drilling for the 8-year period was 3,513,000 ft.

Completion reports for 1952 show only 10 wells completed that year below 15,000 ft., for a total of about 170,000 ft. of hole. By 1960, wells in this classification accounted for 3,838,000 ft. of drilling for a net gain of 3,668,000 ft. over total for 1952. That deep-well gain was more than the increase in total drilling.

Drilling in the shallow areas was only slightly higher in 1960 than in 1952, and most of the increase was for wells shallower than 1,250 ft.

The 2,500-7,500 ft. depth range contains three statistical depth groups. There was a net decline in total footage for each of these groups in the 1952-60 period (OGJ, Oct. 23, p. 206).

The largest footage gain for the 8-year period was in the 10,000-12,500-ft. group with a net increase of 8,424,000 ft.

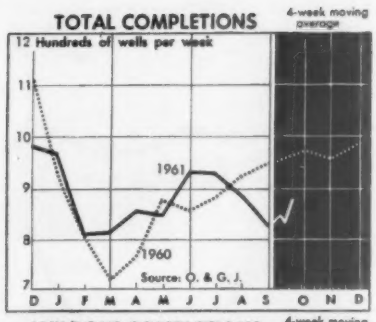
A large portion of higher drilling cost has been due to shifts in drilling by depth classifications. Between 1952 and 1960, drilling deeper than 10,000 ft., showed a net gain of 17,092,000 ft. Footage costs at these depths range from $7.39 to $27.81 above cost for average well.

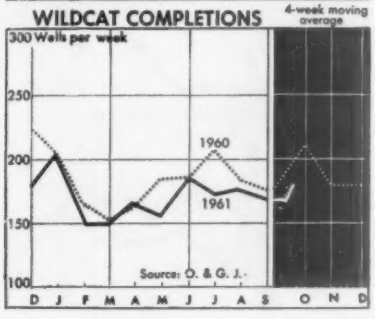
If these trends continue, drilling cost per foot will have to rise. Operators and contractors can not be expected to overcome these depth factors by increases in efficiency.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,115,060	DOWN	45,425	UP	212,173
Crude stocks	251,957,000	UP	2,000,000	UP	20,404,000
Completions	1,002	UP	190	UP	30
Refinery runs	8,365,000	UP	41,000	UP	418,000
Gasoline stocks	185,305,000	DOWN	436,000	DOWN	1,697,000
Kerosine stocks	36,485,000	UP	156,000	DOWN	322,000
Distillate stocks	172,957,000	UP	2,538,000	DOWN	4,675,000
Residual stocks	50,408,000	UP	426,000	DOWN	521,000
Four-product stocks	445,155,000	UP	2,684,000	DOWN	7,215,000
Total imports	1,735,900	DOWN	366,500	DOWN	60,300

Drilling





Active rotary rigs

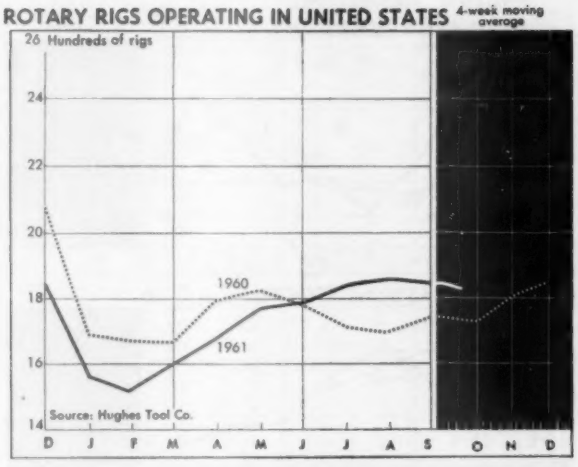
	10-23-61	10-16-61	10-24-60
Alabama	6	5	2
Alaska	10	9	7
Arkansas	15	18	12
Arizona	3	3	2
California	100	94	72
Land	95	87	69
Offshore	5	7	3
Colorado	27	18	56
Florida	1	1	3
Land	0	0	2
Offshore	1	1	1
Georgia	0	0	1
Illinois	46	49	50
Indiana	8	8	9
Iowa	1	1	1
Kansas	109	108	104
Kentucky	9	8	5
Louisiana	271	285	278
North	47	47	37
S. Inland waters	93	102	95
S. Land	78	82	73
Offshore	53	54	73
Michigan	22	23	28
Mississippi	66	64	61
Missouri	2	2	1
Montana	24	19	23
Nebraska	19	21	25
Nevada	1	1	0
New Mexico	100	102	88
New York	2	2	2
North Carolina	1	1	0
North Dakota	12	12	16
Ohio	7	5	5
Oklahoma	194	183	157
Oregon	0	0	1
Pennsylvania	7	10	10
South Dakota	2	0	0
Tennessee	0	1	0
Texas	625	629	572
S. Inland waters	11	11	9
S. Land	190	169	156
Offshore	0	0	1
North	56	62	43
Panhandle	48	53	44
East	59	67	56
West Central	153	155	151
West	108	112	112
Utah	46	45	26
Washington	0	0	1
West Virginia	12	12	6
Wyoming	68	58	68
Total U. S.	1,816	1,797	1,692
Cum. avg. to date	1,726	1,724	1,734
Western Canada	155	150	149
Eastern Canada	1	1	1
Grand total	1,972	1,948	1,842

Hughes Tool Co. report.

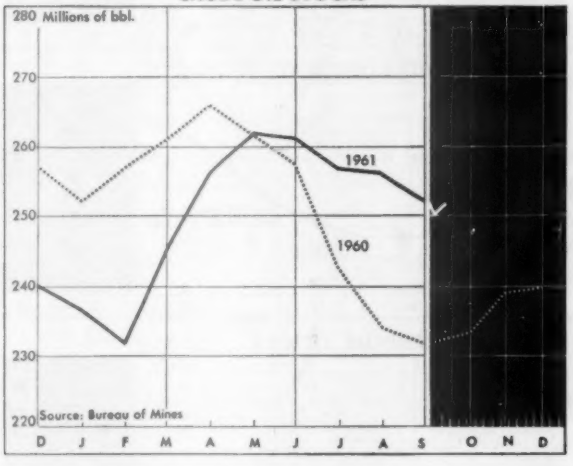
Weekly well completions . . . Week ended October 21, 1961

	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1961	1960	Total	Crude	Cond.	Gas	Dry	1961	1960
Arkansas	13	5	0	0	8	0	39,268	414	481	3	0	0	0	3	88	126
California	59	46	0	3	9	1	153,229	1,435	1,339	5	0	0	2	3	217	247
Colorado	36	2	0	15	19	0	151,162	527	510	11	1	0	1	9	240	261
Illinois	49	22	0	0	27	0	122,002	1,603	1,839	15	2	0	0	13	371	391
Indiana	22	9	0	0	13	0	40,876	606	855	7	1	0	0	6	163	314
Kansas	73	31	0	2	40	0	249,965	3,935	3,189	12	1	0	0	11	721	852
Kentucky	58	12	0	19	26	1	110,721	1,536	1,679	4	0	0	0	4	104	158
Louisiana	81	34	1	7	39	0	517,757	3,060	2,901	19	0	0	0	19	516	452
North	41	17	0	4	20	0	155,146	1,281	1,097	15	0	0	0	15	247	217
South	32	12	1	3	16	0	281,633	1,338	1,403	4	0	0	0	4	225	208
Offshore	8	5	0	0	3	0	80,978	444	401	0	0	0	0	4	44	27
Michigan	31	4	0	4	13	10	89,184	641	762	8	1	0	0	7	233	205
Mississippi	12	6	0	0	6	0	113,736	436	554	4	0	0	0	4	154	212
Montana	12	1	0	1	10	0	68,732	326	266	7	0	0	0	7	156	125
Nebraska	17	4	0	1	12	0	83,299	796	710	9	1	0	0	8	391	302
New Mexico	45	22	0	11	12	0	256,586	1,464	1,522	9	4	0	0	5	241	216
West	19	9	0	9	1	0	94,632	637	545	3	2	0	0	1	78	60
East	26	13	0	2	11	0	161,954	827	977	6	2	0	0	4	163	156
North Dakota	5	1	0	0	4	0	35,241	208	242	3	0	0	0	3	57	66
Ohio	16	11	0	1	4	0	32,275	834	869	0	0	0	0	0	35	40
Oklahoma	108	57	0	8	36	7	420,253	4,619	3,747	8	0	0	2	6	444	583
Texas	253	142	0	26	76	9	1,243,343	11,576	12,737	55	3	0	3	49	2,458	2,627
Dist. 1	19	13	0	1	5	0	52,179	733	903	3	0	0	0	3	298	332
Dist. 2	12	3	0	1	8	0	93,098	613	622	8	0	0	1	7	183	153
Dist. 3	15	7	0	2	6	0	137,438	908	965	6	0	0	0	6	179	181
Dist. 4	22	10	0	2	10	0	131,893	965	876	8	0	0	0	8	253	243
East	24	17	0	1	6	0	141,999	949	1,037	6	0	0	0	6	247	215
Dist. 7-B	26	9	0	0	12	5	87,980	1,447	1,835	8	1	0	0	7	403	516
West	65	50	0	4	9	2	310,910	2,897	3,266	5	2	0	1	2	568	507
Dist. 9	48	26	0	5	15	2	164,007	2,120	2,385	9	0	0	0	9	230	432
Dist. 10	22	7	0	10	5	0	123,839	944	848	2	0	0	1	1	97	48
Utah	8	0	2	1	5	0	53,796	198	189	4	0	0	0	4	91	71
West Virginia	21	4	0	17	0	0	51,161	801	652	0	0	0	0	0	7	7
Wyoming	20	11	0	1	7	1	80,960	784	852	5	0	0	0	5	295	349
Misc. (Pa.)	63	28	0	19	5	11	171,910	1,187	1,051	8	0	0	4	4	236	187
Total U. S.	1,002	452	3	136	371	40	4,085,456	36,986	36,946	196	14	0	12	170	7,218	7,791
Prev. week	812	401	7	87	304	13	3,413,680	.....	.....	178	17	2	12	147	.....	.....
Cum. 1961	36,986	16,605	701	3,752	13,428	2,500	150,224,559	.....	.....	7,218	641	77	327	6,173	.....	.....
Cum. 1960	36,946	16,682	1,076	3,042	14,085	2,061	153,453,658	.....	.....	7,791	697	84	264	6,746	.....	.....
Western Canada	25	14	0	4	6	1	120,254	1,814	1,842	4	1	0	0	3	433	485

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



Crude-oil stocks by states of origin*

(Thousands of barrels)

	10-14-61	10-7-61	10-15-60
Pennsylvania	2,290	2,307	2,338
Other Appalachian	1,481	1,398	1,443
Illinois, Indiana, Michigan	10,068	10,191	9,007
Nebraska and North Dakota	3,441	3,514	2,727
Kansas	9,002	8,596	8,434
Oklahoma	16,681	16,309	15,217
Arkansas	1,674	1,580	1,842
Louisiana	20,365	20,583	17,824
North	3,375	3,301	2,995
South	16,990	17,282	14,829
Mississippi, Alabama, Florida	3,916	3,608	1,992
New Mexico	9,096	9,273	8,235
Texas	107,695	107,908	97,894
East Texas	7,814	8,236	7,505
West Texas	47,714	48,063	48,525
Texas Gulf	19,836	19,451	16,311
Other Texas	32,331	32,158	25,553
Wyoming	16,083	16,284	15,180
Other Rocky Mountain	9,944	9,967	9,802
California	24,305	24,535	25,804
Foreign	†15,916	13,904	13,814
Total	**251,957**	249,957	231,553

*Bureau of Mines. †Includes 4,905,000 bbl. in California.

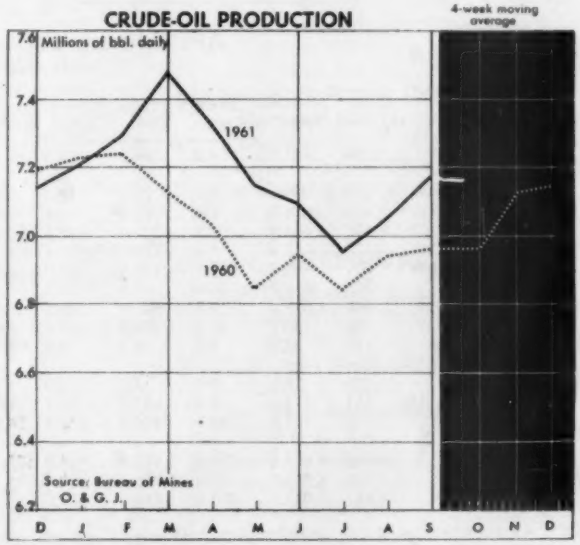
Daily average production for week

	October 21, 1961 Crude oil	Lease condensate	Total	Oct. 14 total
Alabama	16,900	.....	16,900	16,900
Alaska	23,800	.....	23,800	23,750
Arkansas	73,400	150	73,550	73,475
California	814,000	.....	814,000	815,200
Colorado	126,300	.....	126,300	127,800
Eastern	39,000	.....	39,000	40,800
Florida	900	.....	900	900
Illinois	200,300	.....	200,300	226,900
Indiana	31,400	.....	31,400	31,500
Kansas	†308,760	.....	†308,760	†310,035
Kentucky	52,100	.....	52,100	52,000
Louisiana	1,025,950	158,450	1,184,400	1,185,125
North	101,400	6,175	107,575	108,300
South	924,550	152,275	1,076,825	1,076,825
Michigan	52,200	.....	52,200	52,500
Mississippi	146,000	4,100	150,100	150,100
Montana	89,500	.....	89,500	88,600
Nebraska	72,000	.....	72,000	71,600
Nevada	400	.....	400	400
New Mexico	308,000	7,500	315,500	315,500
North Dakota	60,400	.....	60,400	58,800
Oklahoma	†507,100	.....	†507,100	†520,050
Texas	2,405,000	92,000	2,497,000	2,497,000
Dist. 1	43,000	2,800	45,800	45,800
Dist. 2	103,000	8,000	111,000	111,000
Dist. 3	305,000	38,000	343,000	343,000
Dist. 4	176,000	13,500	189,500	189,500
Dist. 5	26,000	700	26,700	26,700
Dist. 6	115,000	8,500	123,500	123,500
East Texas field	126,000	.....	126,000	126,000
Dist. 7-B	125,000	450	125,450	125,450
Dist. 7-C	106,000	3,550	109,550	109,550
Dist. 8	980,000	12,000	992,000	992,000
Dist. 9	194,000	2,500	196,500	196,500
Dist. 10	106,000	2,000	108,000	108,000
Utah	92,800	.....	92,800	93,100
Wyoming	406,100	.....	406,100	407,900
Others	‡550	.....	‡550	‡550
Total U. S.	6,852,860	262,200	**7,115,060**	7,160,485
Change from prev. week, down			**45,425**	.....
Canada	†637,200	†17,500	†654,700	†633,600

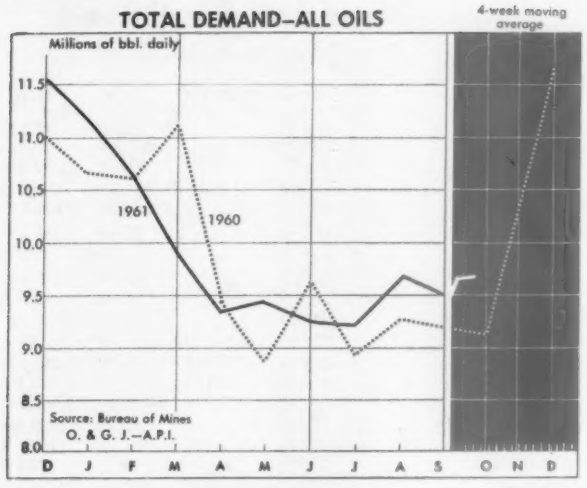
Total U. S. prod.—Jan. 1-Oct. 21 ..... 2,113,040,400 bbl.
Same period last year (crude plus cond.) ..... *2,069,417,500 bbl.

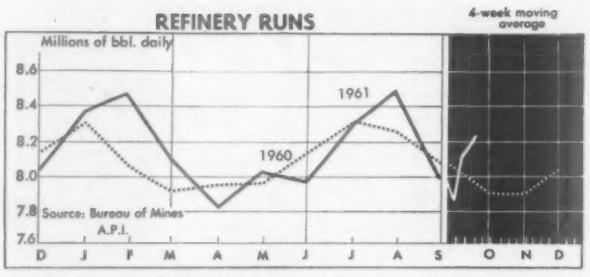
*Includes 66,488,100 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona.

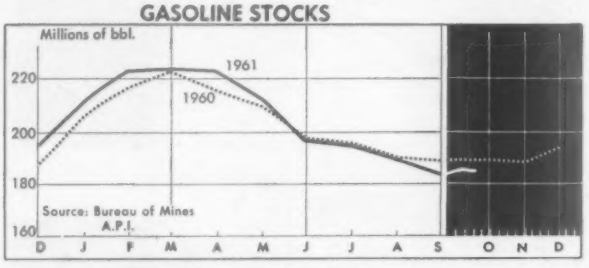
CRUDE-OIL PRODUCTION

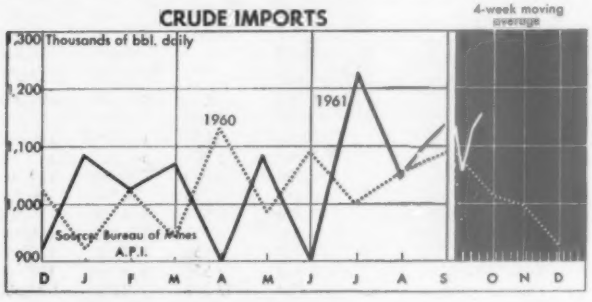


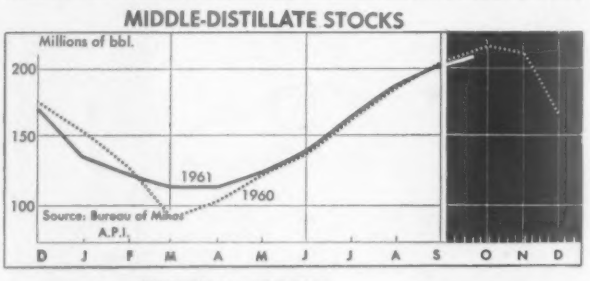
Refining

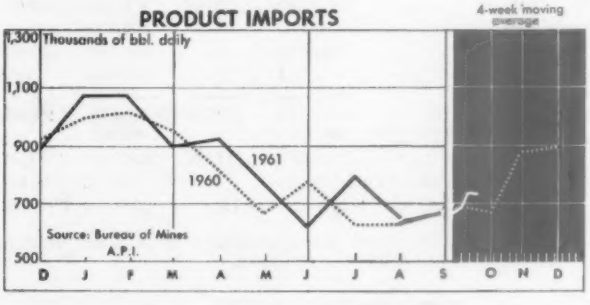


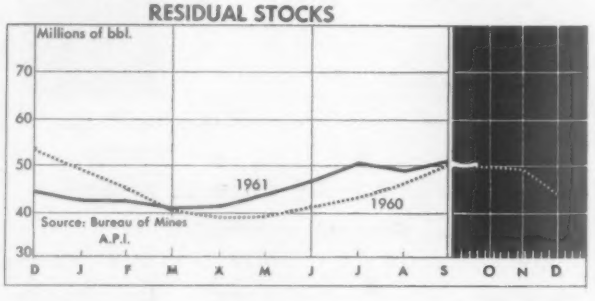












API refinery report—October 20, 1961

(Thousands of barrels)

District—	Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.	Stocks‡: Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, October 1960: Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.
East Coast	1,094	488.9	33.4	294.2	138.6	45,639	14,450	69,090	14,476	1,159	517.7	36.6	341.5	143.9
Appalachian:														
District 1	104	49.4	3.7	22.1	10.4	5,559	731	4,160	392	75	30.7	2.1	15.5	9.3
District 2	113	59.7	6.9	21.6	11.1	3,072	472	1,728	223	108	56.5	5.7	21.1	11.3
Ind., Ill., Ky.	1,530	806.9	90.9	321.0	128.7	31,026	7,469	30,746	5,874	1,420	725.4	77.9	311.4	156.6
Minn., Wis., Dak.	128	58.6	5.3	29.7	15.3	6,786	1,887	8,540	649	118	55.4	4.7	29.2	16.7
Okla., Kans., Mo.	651	362.4	19.7	148.6	17.0	16,643	1,906	13,187	1,061	674	375.2	8.8	169.4	20.0
Inland Texas	305	216.9	10.6	48.3	20.7	7,125	622	1,675	2,725	276	218.8	9.2	44.0	18.9
Texas Gulf Coast	2,046	1,026.4	139.0	605.0	126.3	23,301	3,485	17,365	5,293	1,864	972.9	124.1	473.3	128.3
La. Gulf Coast	732	360.4	65.2	174.7	45.1	9,921	2,007	7,045	1,266	674	340.5	76.0	135.6	47.2
N. La. and Ark.	117	66.4	5.1	26.1	6.7	5,986	836	2,459	213	110	66.6	6.1	21.7	5.6
Rocky Mountain:														
New Mexico	29	15.3	0.4	5.1	2.9	703	39	199	81	14	9.8	0.3	2.5	2.2
Other Rocky. Mt.	264	114.4	7.0	55.3	33.1	5,044	687	2,571	1,187	284	136.8	2.9	65.4	29.2
West Coast	1,252	561.9	46.4	220.9	260.8	24,500	1,894	14,192	16,968	1,132	527.1	32.5	184.3	241.7
Oct. 20, 1961	8,365	4,187.6	433.6	1,972.6	816.9	185,305	36,485	172,957	50,408	7,908	4,033.4	386.9	1,814.9	830.9
Oct. 13, 1961	8,324	4,136.7	417.0	1,916.3	852.4	185,741	36,329	170,419	49,982	.....	.....	.....	.....	.....
Oct. 21, 1960	7,947	4,043.0	417.0	1,818.3	772.6	187,002	36,807	177,632	50,929	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

CRUDE-OIL PRICES

Gravity schedule

	Signal Hill, Calif.	Oklahoma	West Tex. (sour)	West Tex. (inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver-Julesburg	Wyo. (sour)
14-14.9	$1.86	....	....	....	....	....	....	....	....
15-15.9	1.93	....	....	....	....	....	....	....	$1.81
16-16.9	2.00	....	....	....	....	....	....	....	1.86
17-17.9	2.06	....	....	....	....	....	....	....	1.91
18-18.9	2.13	....	....	....	....	....	....	....	1.96
19-19.9	2.20	....	....	....	....	....	....	....	2.01
20-20.9	2.27	$2.49	†$2.35	$2.61	$2.29	$2.95	$2.90	‡$2.38	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.40	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.42	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.44	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.46	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.48	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.50	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.52	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.54	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.56	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.58	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.60	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.62	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.64	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.66	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.68	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.70	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.72	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.74	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.76	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.78	2.95

*Cooke, Grayson, Montague. †Other posting starts at $2.55. ‡Some at $2.58.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.10-3.25
Conroe	3.23-3.53
Van	2.93-3.08
Pennsylvania Grade:	
Bradford	$4.80
Middle District	4.52
Southwest Pennsylvania	4.25
West Virginia	4.17
Buckeye Grade	4.08
Illinois Basin	**3.00**

FOREIGN

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)	
Arabian, 34.0°-34.9°, Ras Tanura	$1.80
Iranian, 34.0°-34.9°, Bandar Mashur	1.78
Iranian, 34.0°-34.9°, Abadan	1.73
Iraq, 35.0°-35.9°, Fao	
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.59
Qatar, 41°-41.9°, Umm said	1.95
Middle East, E. Mediterranean:	
Arabian, 34.0°-34.9°, Sidon	$2.17
Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli	2.19
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 36°	2.42
Canada:	
Leduc-Woodbend	$2.63
Redwater (Alta.)	2.52
Weyburn (light)	2.185
Midale C	1.89
Venezuela:	
Cumarebo, 47°-47.9°, Tucupido	3.34
San Joaquin, 40°-40.9°, Puerto La Cruz	3.08
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Price for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

TANKER RATES (Long ton)

(Latest reported spot fixtures)

★ Gulf-NY, clean (ATRS—7.5%)	$2.64
★ Gulf-NY, dirty (ATRS—22.5%)	2.21
★ Carib.-NY, dirty (ATRS—40%)	1.65
★ Carib.-UK, dirty (Scale—45%) (17s. 11d.)	2.52
★ PG-UK, dirty (Scale—60%) (25s. 5d.)	3.56

★ Denotes change from previous week.

REFINED PRODUCTS

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (91 octane)	9.50-9.75
Premium (99 octane)	12.25-12.50
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.50-11.00
Regular (92 octane)	10.75-11.25
Premium (98 octane)	11.75-12.25
California (rack) Los Angeles:	
Regular (90 octane)	11.20
Premium (94 octane)	12.20
Premium (100 octane)	13.35
Caribbean area (cargoes):	
Regular (87 octane)	9.00
Premium (97 octane)	11.50

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.50-9.75
Diesel oil (58 d.i. and above)	9.00-9.25
Distillate No. 1	9.00-9.25
Distillate No. 2	8.25-8.50
Gulf Coast (cargoes):	
Kerosine 41-43	9.50
Distillate No. 2	8.50
New York Harbor (barges):	
Kerosine 42-43	11.20
Distillate No. 2	10.20
Diesel fuel, 48-52 d.i.	10.35
Caribbean area (cargoes):	
Distillate No. 2	8.10

RESIDUAL FUEL

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.65-1.75
Gulf Coast (cargoes):	
★ Bunker C fuel	2.20
New York Harbor (barges):	
Bunker C fuel	2.52
Caribbean (cargoes):	
Bunker C fuel	2.00
California (rack):	
Bunker C fuel, Los Angeles	2.25

CLASSIFIED ADVERTISING

. . . your market place for the oil and gas industry

RATES:

- UNDISPLAYED CLASSIFIED: 30c a word per issue. 10% discount for three or more consecutive issues. $5.00 minimum charge. Blind box in care count nine extra words. Not subject agency commission.
- DISPLAYED CLASSIFIED: $20 a column inch one issue, 10% discount three or more consecutive issues. Minimum size one inch. Subject to agency commission.
- All classified payable in advance.
- DEADLINE: Copy to reach The Oil and Gas Journal not later than 9 a. m. on Wednesday preceding date of publication. Send advertisements to: Classified Advertising Manager, THE OIL AND GAS JOURNAL, P. O. Box 1260, Tulsa 1, Oklahoma.

EXCEPT . . .

WESTERN STATES: (California, Washington, Oregon, Idaho, Nevada, Utah, and Arizona). Write: Classified Departments, Inc. The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif. Phone AXminister 2-0287. Copy deadline Monday noon.

FOR SALE EQUIPMENT

AN INVESTMENT! Productive advertising is an investment rather than an expenditure. Experienced oil men have found that The Oil and Gas Journal is their best classified advertising medium.

USED GAS PROCESSING Equipment; Glycol and Dry Dessicant Dehydrators; Quick-cycle Hydracarbon Recovery Units; Water Flood Filter-pump Units. Also new oil and gas production equipment. Engineered Specialties Co., P. O. Box 35683, Phone FL 1-5284, Dallas 35, Texas.

SERVICE TRUCKS; Testing, temperature and pressure. Phone DA 1-2899, El Dorado, Kansas.

50,000 FT. 20 inch No. 1 grade used pipe. Lengths 20 ft. square cut ends. Weight 78# to the ft. High Tensile Pipe. Indiana-Ohio Pipe Co., P. O. Box 5462 Shep. Sta., Columbus 19, Ohio. Phone CL 3-5527—CL 3-5528.

LIQUIDATION

at ESSO REFINERY Balto., Md.

MOST EQUIPMENT NEW 1956

TOWERS—30″ to 84″ diameter, 20′ to 97′ high, 7 to 34 trays, up to 360 PSI

DRUMS—3′ to 12′ diameter, 12′ to 45′ long to 530 PSI, some lined—some NEW

PETRO-CHEM FURNACES—30.7; 19.3; 10.4; 9.7; 7.5 MM BTU/Hr.

NEW FURNACE TUBES—4000′—⅜″ & ½″ Wall Croloy 5—4″ to 6″

PUMPS—88 to 400 GPM up to 2040′ head—up to 8 Stage

HEAT EXCHANGERS—CONDENSERS

Stainless Tube —235 to 2320 Sq. Ft.
Croloy 5 Tubes —573 to 1040 Sq. Ft.
Admiralty Tubes —216 to 1640 Sq. Ft.
Steel Tubes —238 to 2240 Sq. Ft.

COMPRESSORS & BLOWERS

7500CFM @ 42.5PSIG, 1250HP Synch.
129CFM @ 193PSIA Worth. HB 7½x9

LARGE QUANTITY
TRANSFORMERS & MOTORS

WRITE FOR CATALOG

HEAT & POWER CO., INC.

60 East 42nd St., New York 17, N. Y.
310 Thompson Bldg., Tulsa, Okla.
Boston & Haven St., Baltimore 24, Md.

FOR SALE EQUIPMENT

1—COOPER MODEL W Double Drum Unit Mounted on 1955 F-8 Ford. 1—Cooper Model W Single Drum Unit Mounted on 1954 Chevrolet. 1—Bucyrus Erie 22-W Spudder Mounted on 1955 Chevrolet. All rigs in first class condition. Financing can be arranged to a responsible person. Kent Well Servicing Company, Inc., Drawer 470, El Dorado, Kansas, Phone DA 1-9440

SELL OR trade for production, surplus equipment, anything of equal value. 4,000′ Rotary, diesel powered, 7¼ x 14 pump, all miscellaneous equipment complete, ready for drilling. $25,000 cash or will finance. Milford Griffin, 580W, Chelsa, Oklahoma.

2500 FAILING, 58′ mast, 58′ derrick for 200 Sullivan 5x8 pump on skids. Fred Butler, Box 481, Pueblo, Colo.

36-L BUCYRUS Erie with 145 GK Waukesha gas/gasoline engine, cleaned and repainted, very good condition, completely and fully equipped with tools, doghouse, lines, etc.—ready to drill. Inventory mailed upon request. Shafer Drilling Co., P. O. Box 582, Wooster, Ohio. AN 3-7326.

FOR SALE

2 FLOATING STEEL CYLINDERS

250 FT. LONG, 28 FT. DIAMETER
FRUSTRUM SHAPED AT EACH END

Ideal for use in connection with offshore drilling rigs, storage, floating platforms, etc.

Located: Orange, Texas

UNION MINERALS & ALLOYS CORP.
45 Nassau Street New York 5, N. Y.

LIQUIDATION
Little Rock, Arkansas

11—28,000 gal. horiz. tanks, 11′ x 38′, dished, ASME 75 psi.
3—Worthington #LTC-4 air comp., 3,500 CFM, 24 x 15, 500 HP, nat. gas driven.
50—Heat exchangers, T316 Stainless, up to 2,000 sq. ft.

PERRY EQUIPMENT CORPORATION
1402 NORTH SIXTH STREET
Philadelphia 22, Pa., Phone POplar 3-3505

25,000′
12¾″ OD Used, ¼″ Wall
Gas Line Pipe - Dresser End, SRL
@ $_____
10,000′
18″x5/16″ ditto
@ $_____
Prompt Shipment From Stock
F.O.B. Columbus, Ohio
Columbus Steel Supply Company
1000 Bonham Avenue
Columbus 3, Ohio AX 4-4461

FOR SALE EQUIPMENT

FRACTIONATOR, REBOILERS, Condensers, Coolers, Exchangers, Dehydraters. Infilco Filters, BS & B Still and Contactor, National Dearator, Waukesha Engines, Marley Fans with gear reducers, Simplex and Centrifugal Pumps, Steam Turbine, and Regulation and Control Equipment. In service approximately 5 years. Direct inquiries to Box M-603, The Oil and Gas Journal, Tulsa, Oklahoma.

SALE OR LEACE: Clark HMA—8 350 BHP gas compressor. 8¼″x4½″ compressor cylinders. Located near Dubois, Penna. Keta Gas & Oil Company, Box 250, Bradford, Penna.

1 P-23 WALKER-NEER double-drum unit with spudder attachment on 6 x 6 GMC all tools and ready. Bargain. J. C. Cantrell Box 1016, Ada. Oklahoma.

2500 TRAILER MOUNTED Franks. Powered with 671 and 471 G.M. Diesels, 7x10 Wheatly pump, water pump, 1000′ water line, approximately 3000′, 3″ or 4″ drill pipe. Two Chevrolet trucks, ton and half, 300 electric welder, miscellaneous drilling tools complete with doghouse. All excellent condition. $14,500. Also, 2500 Franks Friction Clutch Drawworks, completely overhauled. $750.00. Milford Griffin, 580W, Chelsa, Oklahoma.

FOR SALE: Hydrostatic Testing Unit mounted on 1953 Chevrolet Truck, 1½ Ton.
UNIT CONSISTS OF: 2—McFarland Pumps—Model 6—5¼″—6B 1—Jacuzzi Pump—Model 15-FTZ-5. Powered by Wisconsin Engine, Model VH4D with 600 Gallon Water Tank and necessary valves, fittings, etc., to operate as a unit.
McADAMS PIPE & SUPPLY CO.
P. O. Drawer 285 Great Bend, Kansas
GL 3-9246

Sales—GAS COMPRESSORS—Rentals

Save 25% to 40% over new price
Used 30 h.p. to 300 h.p.—Guaranteed
New and Rebuilt Gas Engines
INDEPENDENT FIELD SERVICE, INC.
505 Monigomery St., Shreveport, La.
Phone 425-3497

AT N. LITTLE ROCK, ARKANSAS

3—Worthington #L T C-4, compressors, 3500 CFM @ 45 PSI, 24 x 15, 2-cyl., 500 HP, 4-cycle, gas-engine drive.
Phone POplar 3-3505

PERRY EQUIPMENT CORP.
1402 N. Sixth St.
Philadelphia 22, Pa.

(6) 96,000 Bbl. 120′x48′
WELDED CONE ROOF
OIL STORAGE TANKS
INSTALLED NEW in 1952
Dismantled, Matchmarked For Reerection $75.00 N.T.
FOB Baltimore, Md.

HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N.Y.
Boston & Haven Sts., Baltimore 24, Md.

FOR SALE EQUIPMENT

A GIGANTIC AUCTION LIQUIDATING FLETCHER OIL & GAS DRILLING CORPORATION

November 7 & 8, 1961

9:00 A.M. (CST)

STAMFORD, TEXAS

This large auction includes six drilling rigs, lease equipment, oil field trucks, approximately 22,600′ drill pipe & 78 drill collars, pipe tubing & sucker rod, private line two-way radio, automobiles, office & shop equipment, Real Estate in Stamford & Breckenridge.

NATIONAL CA50 Ideal Consolidated W/L-3000 V12 LeRoi engine, 127′ L.C.M. pin type hi-speed cantilever mast 6″x16″ Wilson Snyder power pump S/N 922520 W/145 GKU Waukesha, Shaffer 10″-900 series double blowout preventer, 17½″ Ideco rotary table.

UNIT U-15 drawworks, S/N 446, Model L-3000 LeRoi engine, 131′ L.C.M. mast, 7½″x16″ G.P. GXP pump, Regan 10¾″ blowout preventer, 17″ #SHS-171-B rotary table.

UNIT U-15 S/N 485 W/2 - LROU Waukesha engine, 131′ std. L.C.M. cantilever mast, C250 National pump, 17½″ Ideal rotary table.

WILSON GIANT drawworks, S/N 6964, 2 - NKRBU Waukesha engines, 87′ L.C.M. cantilever portable mast, 17¼″ Emsco rotary table, 7¼″x14″ FXK Gardner-Denver pump.

WILSON GIANT drawworks S/N 7130, 2 - LRO-RB Waukesha engines, 127′ L.C.M. jackknife derrick, 17½″ Oilwell rotary, 7¼″x16″ GXQ Gardner-Denver pump.

WILSON ATLAS drawworks, S/N 7093, 2 - V-122 Climax engines, 17.5 Ideco rotary, 133′ Ideco full view mast FXQ 7¾″x16″ Gardner-Denver pump.

Note: This is only a partial listing. Write Auctioneer for free brochure.

This Auction Conducted by

MILLER & MILLER AUCTIONEERS, INC.

6100 Camp Bowie
PE 8-5406
FORT WORTH, TEXAS

FOR SALE EQUIPMENT

15,000′ of 8⅝″ - 3/16″ wall thickness plain end pipe. Midwest Pipe & Supply Co. Oklahoma City, Oklahoma.

1 OILWELL 66 Rotary with Lee C. Moore mast and 7500 ft. of 4½″ drill pipe. Keta Gas & Oil Company, Box 250, Bradford, Penna.

EXCELLENT 10,000 USED RIG!

U-40 w/3 - Climax VU-280 power; Ideco 133′ mast w/9′ subs., 5′ high engine sub-base; 16″ GXP and 14″ FXK slush pumps; 20½″ Table; BJ-4200 Triplex Hook; 66″ streamlined trav. block; Emsco 'H' swivel; all other rotary accessories—9000 ft. 4½″ 16.60# 'E' drill string, 33 - drill collars.

Complete, all accessories, ready to run.

Location—Midland Yard, Texas

Lucey PRODUCTS CORPORATION
624 South Cheyenne Avenue
Tulsa—LU 4-4711—Okla.

Condensers, Reboilers, Exchangers, Fracionator columns various types, Surge Tanks, Butane Tanks, Propane Tanks, Centrifugal & Steam Pumps, Blowers, Complete Poly Plant, Flash Towers, Steam Turbines, Explosion Proof Motor Starters, Recorders & Controllers. Low Prices, Good Equipment. Located at Borger, Texas, Tulsa and St. Louis areas.

KINSLOW EQUIPMENT COMPANY
P. O. Box 5283
WE 9-6896, Tulsa 12, Oklahoma

1-Super 38 Wilson double drum well servicing units with 87′ derrick, reverse equipment, tubing tongs, etc. truck mounted.

1-Mogul 42 Wilson double drum well servicing unit with 87′ mast, tubing tongs, hand tools, etc. truck mounted. Box M-616, The Oil and Gas Journal, Tulsa, Oklahoma.

PERFORATING & LOGGING EQUIPMENT

- **HOIST UNITS**
  NEW AND USED
- **LOGGING EQUIPMENT**
  ELECTRIC, GAMMA, NEUTRON, TEMPERATURE
- **PERFORATING**
  GUNS AND SUPPLIES
- **PLUGS**
  SETTING TOOLS, PLUGS, PACKERS AND DUMP BAILERS

FOR CATALOG AND PRICES WRITE TO:

GO PERFORATOR SUPPLY
Box 1936, Fort Worth, Texas
FOREIGN AND DOMESTIC SALES

EQUIPMENT WANTED

DESIRE 1—Approximately 10x14 welded steel tank. Must be good condition suitable for storage of liquid sulphur. National Sulphur Company, Box 91, Midland, Texas.

TANKS—WANTED

6—12′x10′ 202 Bbl. and 8—10′x15′ 210 Bbl.

No. 1 Used Welded Steel Stock Tanks. Give complete description, manufacturer's name and quote price present location also price delivered our property Gorham, Kansas. Contact H. D. Lawver, Home-Stake Production Company, 2302 Philtower Bldg., Phone LU 4-5281, Tulsa, Oklahoma.

HELP WANTED

WANTED, by progressive independent producing company—Graduate Petroleum Engineer with a minimum of 8 years experience in drilling programs, well completions and workover recommendations. Furnish full history of experience. All replies will be treated confidentially. Box M-599, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL JOB DIRECTORY, foreign and domestic, showing where to apply for jobs $5.00 cash OIML Co., Box 2603, Tulsa, Oklahoma.

ENGINEER — PRODUCTION SUPERINTENDENT. Petroleum Engineer or Geological Engineer having 7-10 years experience with 7 years secondary recovery experience in unitization, design and operation. Location: Illinois Basin. All replies will be considered confidential. Send complete resume' with salary requirements and available date of employment to: Box M-609 The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Manufacturer's Representative for Kansas and Texas Panhandle for established Line Complete Oil Well Subsurface Pumping and Production Equipment. Write. M-615, The Oil and Gas Journal, Tulsa, Oklahoma.

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West Coast refiner requires Laboratory Director to pursue research and development in field of asphalts and allied materials. Advanced degree & record of performance in similar capacity desirable. Challenging work for a man who has the ability to direct activities of ten man laboratory. Our employees know of this advertisement. Send detailed resume to

BOX 31 Q 281, THE OIL AND GAS JOURNAL
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MECHANICAL ENGINEER

Company growth has created need for a graduate Mechanical Engineer for Products Pipe Line Co. in Los Angeles. Applicants should have 5 to 10 years pipe line industry experience, preferably in products. Please send complete resume including salary information to Box 31 Q 282, The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Cal.

HELP WANTED

WELL-SITE GEOLOGIST

Immediate opening. Age 30-35. Minimum five years concentrated sample examination experience in the Mid-Continent, Rocky Mountain or West Texas area. Free to relocate. First location in Nebraska. Salary commensurate with ability and experience. Send resume and recent photo to Hunt Oil Co., 700 Mercantile Bank Bldg., Dallas 1, Texas. Atten: Personnel Dept.

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Experience required in designing all types of refinery process units. Splendid opportunity to advance with engineering and construction firm having world-wide representation. All replies held in strict confidence. Address or call collect:

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SITUATIONS WANTED

ENGINEER—C.E., B.S., M.S. and Ph.D. Major: Petroleum Engineering; Minors: Fluid Mechanics and Mathematics. Eleven years diversified experience in reservoir engineering. Desires a challenging position in research of foreign employment. Complete resume on request. Box M-617, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PETROLEUM ENGINEER—36, married. Twelve years diversified experience including management, financial and policy. Prefer southwest. Top references and resume on request. Box M-596, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST, presently located in South America, 8 years interpretation, administration, wants position with medium-sized company, preferably in Europe (Lybia) or Australia. Box M-602, The Oil and Gas Journal, Tulsa, Oklahoma.

SALESMANAGER, presently with southern refinery desires to relocate. Experienced in all phases of private brand service station operations and wholesale sales of all petroleum products. Prefer southwest location. Married, 38. Box M-614, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINE ENGINEER—Project, Design, Estimating, Mechanical, Civil, General. Registered Professional Engineer and Land Surveyor. 30 years diversified experience. No degree but equivalent education plus excellent experience record. Write at once. P. O. Box 19163, Houston 24, Texas.

PALEONTOLOGIST, 44 single, desires overseas position with oil company. 15 years experience, with Teritary and Cretaceous Foraminifera, and ammonites, in California, Colombia and Libya. Some field and wellsite work. Knows Spanish, learning Arabic. Box M-465, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 41 M.A. 4½ years experience major California Company, 2½ years experience subsurface-development geologist in Brazil. Desires position with aggressive company or independent, foreign or domestic. Complete resume on request: Box M-604, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

LOCAL LEASEMAN wants party interested in purchasing small and scattered $1. per acre leases in counties of Furnas, Harlan, Phelps and Gosper, Nebraska. Box M-600, The Oil and Gas Journal, Tulsa, Oklahoma.

BARTLESVILLE & PERU production on three sides of new well to start 4/8ths working interest for sale for $800.00 per 1/8th reply box 569, Independence, Kans.

ST. LOUIS GROUP with substantial production interested in purchasing primary and secondary oil reserves in Illinois, Indiana, Kentucky or West Virginia. Can handle properties of any size. All replies confidential and all material forwarded will be returned. Box M-575, The Oil and Gas Journal, Tulsa, Oklahoma.

FINANCIAL—Investment Banking Houses and Underwriters reached. Confidential You can send the details of your proposition direct or thru your attorney to Consultant 817—51st Street, Brooklyn, N. Y.

HAVE 70,000 ACRES Southeast Georgia, 10 year leases on Gravity Surveys. Gas and oil seepages in area. Want partner to furnish truck-mounted rotary slim hole drill rig for test drilling five wells through Tusculoosa or 4,500 ft., or help financing drilling deal for interest in acreage or farmout. Will sell 10,000 acre block with good geology reasonable. Chance to win $250,000.00 reward from state. Open for any legal deal for immediate drilling. T. R. Davis, 601 Jackson Street, Vidalia, Georgia. Phone 3639.

OIL, Gas and mining exploration prospects in Saskatchewan, Canada, for year end tax dollar expenditure. For details, write Box M-607, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR QUICK SALE, ⅝ working interest for only $350 per ⅛ to drill shallow well on semiproven 80 acre lease Northwest of Oak Grove oil pool. Details, Write, L. Snavely, Geologist, Box 315, Coweta, Oklahoma.

$3,000,000.00 copper deposit recoverable by leaching (process similar to secondary recovery of oil by water flooding). Will assign half interest for $5,000. To install units; less if you have used pipe and water pumps. Write for engineering data.

Box 117, Encino, New Mexico.

BUSINESS OPPORTUNITIES

EXPLORATION PROSPECTS WANTED

Individual desires up to 25% interest in prospects being drilled before December 15th. Submit only ventures based on sound geology. Prefer extensive acreage and large potential per well. Deal and offeror must stand rigid inspection. Reply to:

EDMUND OIL & GAS
Attention G. R. Stocker, Geologist
P. O. Box 99, Barrington, New Jersey
Telephone: Area Code 609, Lincoln 7-3230

WILL PAY CASH FOR MANUFACTURING OR INDUSTRIAL PLANTS, CONSTRUCTION OR TRUCKING COMPANIES WITH ASSETS $250,000.00 OR LARGER. PRINCIPALS NOT AGENTS. WRITE BOX 8257, DALLAS, TEXAS.

BUSINESS SERVICE

LIST OF 100 oil companies showing names of land-leasing managers and division land managers. $5.00 cash. Oil Industry Mailing List, 405 Tuloma Bldg., Tulsa, Ok.a.

DELAWARE CORPORATION formed and serviced American Guaranty Trust Company. P. O. Box 487, Wilmington, Delaware.

BUSINESS SERVICE INVENTORS

Do you want your Drilling and Well Completion Tools developed and marketed? Either patented or applied for. Mail to Box 31 Q 284, THE OIL AND GAS JOURNAL, Tulsa, Okla. If interested, principal will negotiate, if not will advise promptly.

PRODUCTION WANTED

WANTED: marginal or isolated production. Fast quotes, good prices. Contact Joe A. Huitt, 1306 Philtower, LU 7-3080, Tulsa, Oklahoma.

WORLD'S LARGEST investors will buy primary and secondary oil producing wells and gas production. Send complete information. Must stand strict checking. Special compensation to sellers. Unlimited funds available at all times. Box M-618, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

ROYALTY BUYERS—Income producing gas-distillate royalty, new, deep, dual completed wells, Texas Gulf Coast. Tax benefits being 27½% of depletion allowance. Ogden Oil Company, P. O. Box 409, Taylor, Texas.

FOR SALE 17.5 acres producing overriding royalty, East Hennessy Pool, Kingfisher County, Okla. In center of the most active Mid-Continent Field. If interested write Fletcher Bowles, 820 Braniff Bldg., Phone CEntral 6-5405 or JAckson 4-1700, Oklahoma City, Oklahoma.

LEASE AND DRILLING BLOCKS

ARIZONA—Big "Helium" lease play. Leases Available near Majors $1.00 acre. Terms—Free Maps. Edward Colson, 1716 W. Devonshire, Phoenix, Arizona.

DO YOU HAVE A LEASE TO SELL? For as little as $5 per week you can tell your proposition to over 45,000 oil men through the Journal's classified advertising pages. You'll be surprised how many are interested.

READY TO DRILL direct offset well to Bartlesville Sand. Production three sides. Proven lease. Need three associates. S & M Drilling Production Co., Box 59, Cherryvale, Kansas.

FOR SALE: Up to ½ interest 40 acres offsetting new water flood. One well pumping, good investment for nice income, more good locations to drill. Montgomery County, Kansas. Bartlesville production 730 feet. Box M-593, The Oil and Gas Journal, Tulsa Oklahoma.

FOR LEASE: Mineral rights; 3458 acres block 1. For sale: 357 acres block 2, Val Verde County, Texas. Brown-Bassett field, Payne, 2100 B. Kenwood, Austin, Texas.

EIGHTY ACRE oil and gas lease Mesa County, Colorado. T-10S: R-103W; Meridian 6 P. M. Section 29. Write P. O. Box 282, Redwood City, California.

FOR LEASE 344 acres near Jewett, Texas (Leon County). Contact Louis Lotspeich, 4311 La Branch, Houston 4, Texas.

LEASE AND DRILLING BLOCKS

WHEELER COUNTY, NEBRASKA

Approximately 75,000 acres in two blocks, expiring 1969 and later; average rentals 15c due September, 1962 and annually thereafter. Seismic, magnetometer and subsurface information available. Open for 3500' Cambrian test or outright sale. Interested parties contact P. M. Jones, P. O. Box 1516, Midland, Texas.

LEGAL

SEALED BIDS FOR oil and gas leases on allotted and tribal Indian lands in Payne, Noble, Pawnee and Kay Counties, Oklahoma, will be received until Thursday, November 16, 1961, at 2:00 p. m., C.S.T., at the Pawnee area field office, P. O. Box 97, Pawnee, Oklahoma. Leasing will be governed by regulations of the Secretary of the Interior.

More exploration news

Deep gas-pool find made in Alaskan field

A DEEP gas pool discovery has been made in the heart of the Swanson River pool of Swanson River field in Alaska's Kenai Peninsula.

Standard Oil Co. of California-Richfield Oil Corp. S.R.U. 212-227 was completed flowing an estimated 10 M.M.c.f.d. from a perforated interval at 7,625-35 ft. The well, located in Section 27-8n-9w, was taken to a total depth of 7,800 ft.

Two other gas wells have been completed in Swanson River, a field that includes 42 oil wells. The northern most well in the field, S.R.U. 32-10, was completed as a gas producer from 6,450 ft. after going to 12,029 ft. One gas well has been completed in the Soldotna Creek unit in the southern part of the field. The S.C.U. 243-244 in Section 4-7n-9w was completed as a gas well earlier this year at 6,405 ft.

Texas wildcat hits shallow gas

Ten miles from the nearest field in far-southwestern Texas' Maverick County, C. C. Winn has completed a wildcat discovery well making dry gas from a shallow sand at total depth of 1,250 ft.

The well, 7 Winn Fee, is rated at 1,950 M.c.f.d., open-flow potential. Pressure, shut-in, is 477 psi.

Nearest production is in Chittim field with production from Austin Chalk at 1,500 to 1,600 ft.

Location is 7 miles east of Eagle Pass. A confirmation well is near completion.

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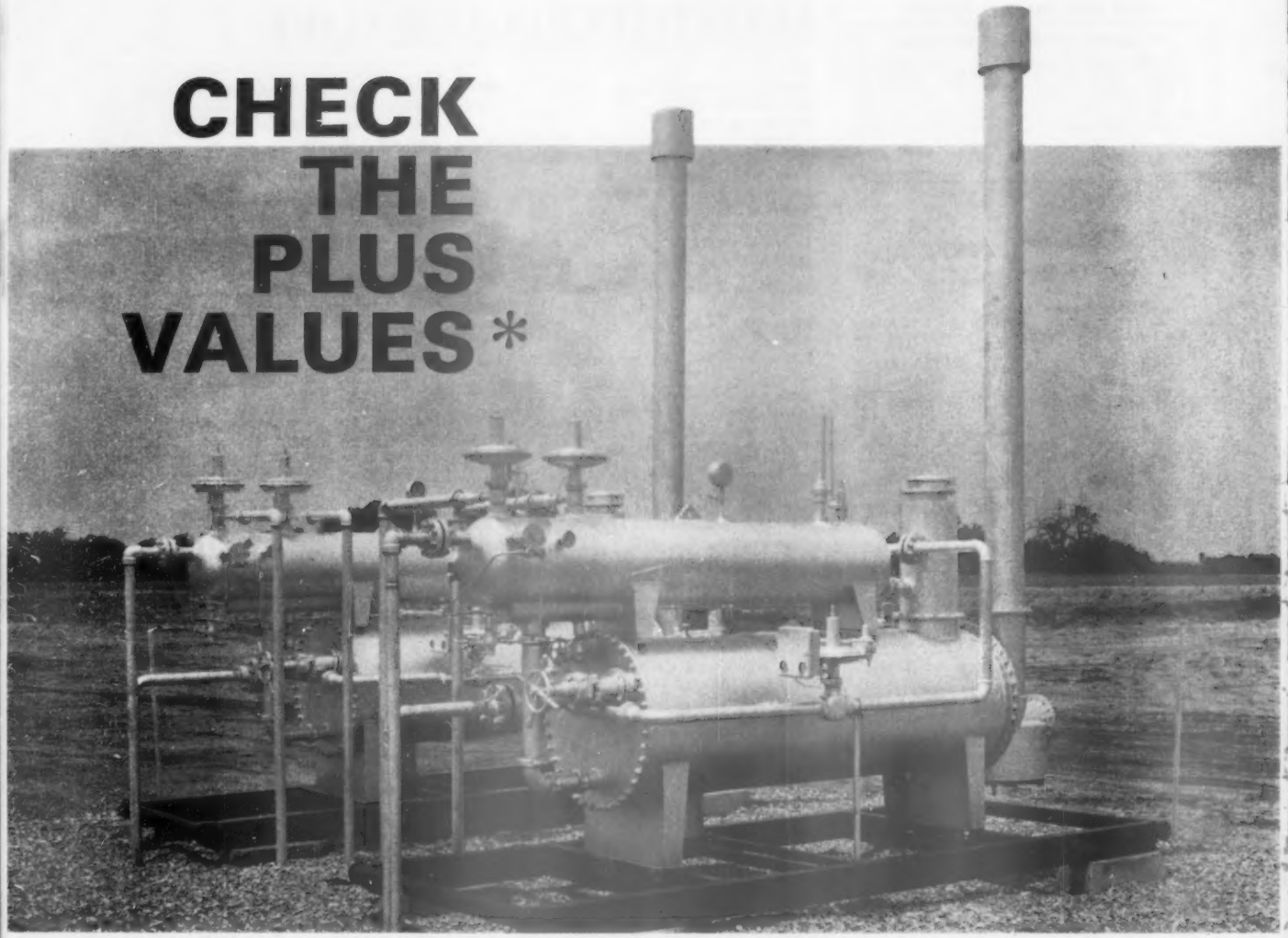

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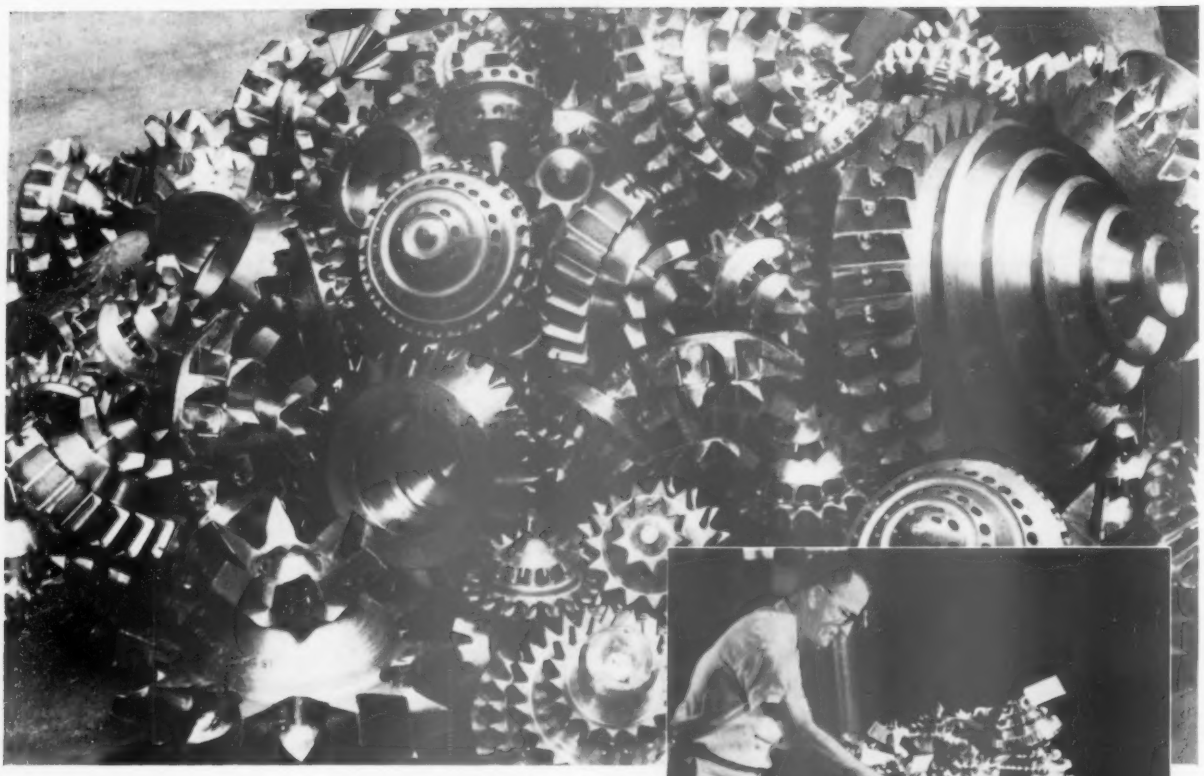

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